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OUR SIXTEENTH VOLUME.

In entering on our sixteenth volume we beg to tender our thanks to the many kind contributors to whom we are indebted for past favors, and to point to the fact that our success has hitherto largely depended on the original papers we have thus secured. During the year death has removed from among us some of our highly valued helpers; LeConte, Chambers and Bailey rest from their labors. The hearty support accorded to our journal by these distinguished entomologists will never be forgotten, but their esteemed counsel can no longer be sought. Death removes the workers, but the work still goes on. From among the younger students of natural history our ranks are being constantly recruited, and to these we must look for a portion of the help we need. We believe that the students of Entomology were never so numerous as they are at the present time, nor were ever facts more carefully noted. The communities of insects are as active and numerous as ever, and what has been recorded of their life history and habits is but small in comparison with that which still remains to be worked out. There is room here for hundreds of laborers, and delightful work for all. Many of our readers have no doubt made original observations which have not yet been recorded, and perhaps the observers have regarded them as not of sufficient importance to publish until rendered more complete by further observation. Many a useful fact in entomological science is lost by such delay. What we should like all our readers to do is to promptly communicate any facts they may have noted which they believe to be hitherto unrecorded, so that others may be helped to occupy the vantage ground thus gained. Our pages are ever freely open to all such communications; they add to the value and usefulness of our journal, and help us in our endeavors to continue to make it a record of original work. We sincerely hope that our readers everywhere will bear this in mind.

We would also remind our members that the annual subscription is now due. Remittances should be made to our Secretary-Treasurer, Mr. E. B. Reed, and all communications for The Entomologist addressed to the Editor.

DESCRIPTION OF LYCÆNA DÆDALUS, BEHR, AND CORRECTION OF ERRORS IN ITS SYNONYMY.

BY W. H. EDWARDS, COALBURGH, W. VA.

I have received from that indefatigable explorer and naturalist, Mr. W. G. Wright, of San Bernardino, several examples of *Lycæna Dædalus*, ♂ ♀. Up to this date the ♂, as described by Dr. Behr, has been unknown to me personally, and by all recent list makers has been set down as a synonym of *Icaroides*, Bois. Its female is *Aehaja*, Behr., also put down as a syn. of *Sæpiolus*, or rather as one of the dimorphic forms of the female of that species.

Mr. Wright made the ascent of one of the lofty mountains in that region, and says: "Saw nothing on the way up, except that at the camping half-way place were a few of these *Lycænæ* and a *Grapta*. Next day, on going up to the high crest, it was a little cloudy, but not very cold (50° probably), yet not one butterfly was seen during the entire day, though I stayed on the crest, 11,550 feet, several hours. On July 1, 1883, in a high, wet meadow, altitude 6,500 feet, and then at varying altitudes from 6,000 to 8,000 feet, I saw these *Lycænæ*. On 1st they were very abundant; the air was full of them. No other *Lycæna* was present. Later, in wet meadows, on another mountain, up to about 8,000 feet, I saw more of them; also, as before, no other *Lycæna* present. I noted the variety of shades of bronze in the female; some are almost yellow, others have but a tinge of bronze on the anal angle." Undoubtedly, the ♂ ♂ are *Dædalus*, Behr, while the females with them are *Aehaja*, Behr.

Dædalus was described in Proc. Cal. Acad., 3, 280, 1867, from three specimens collected by Mr. Hoffman in the "Alpine regions, round the head waters of the Tuolumne River." These were probably all males; but the sex is not stated. It is described as similar to *Icaroides*, Bd., but beneath, the spots, which in the latter are said to be rounded, in *Dædalus* are transversely elongated; and the discoidal mark of hind wings, which in *Icaroides* is wanting, or represented by a white patch, in *Dædalus* is a black line. It is characteristic of *Icaroides* that the spots are round and the discal mark is wanting, though there are exceptions in both cases; a more constant character is found in the white halo around each spot, which is not seen in *Dædalus*. All the six males of *Dædalus* before me have the spots rounded, but one of the females has most of them elongated, as Dr. Behr describes in the male.

Aehaja is described on same page, and the author says: "This species I received also from Mr. Hoffman, who *found it associated with Dædalus.*" The number of specimens examined is not stated. But both sexes of *Aehaja* were described *as alike in color.* As the specimens taken by the Geological Survey almost always came in bad condition, especially with the bodies squeezed as flat as a knife blade, it is not surprising that Dr. Behr mistook some of these for males. That his *Aehaja* agrees with Mr. Wright's females of *Dædalus*, is evident from a type specimen which Dr. Behr sent me at about the date of his description, and which still stands in my collection with his label.

This is the same species also which Dr. Boisduval described, Lep. de la. Cal., 48, 1869, as *Rufescens.* In my Catalogue of 1877, *Dædalus* is set down as a syn. of *Icaroides*, while *Aehaja* is given as a dimorphic form of the female of *Sæpiolus*, *Rufescens* being a syn. of *Aehaja.* I seem to have overlooked the fact that Boisduval described a blue male with the brown female, or *russet* female, as the text says, and this word describes the color, perhaps, better than any other. Boisduval certainly must have been misinformed as to the locality, as he says "it lives on the plains in the interior, in May." Whereas the species is Alpine, and would be taken in midsummer. It is allied to *Sæpiolus* and *Icaroides*, both of which are found in lower elevations.

The synonymy should then be:—

DÆDALUS, Behr.

♀ *Aehaja*, Behr.

♂ ♀ *Rufescens*, Bois.

Although I am not aware that I have ever before seen an example of *Dædalus* ♂, I have had several of the ♀, or *Aehaja*, but cannot state from what particular localities they came.

As the descriptions of both Behr and Boisduval are very short and are scarcely distinctive, and besides are not accessible to most of our collectors, I append my own descriptions of both sexes of this *Lycæna.*

LYCÆNA DÆDALUS, Behr.

Male.—Expands 1.2 inch.

Upper side pruinose-blue, with a metallic lustre when viewed obliquely; costal margin of primaries next base silvery-blue, as is also the inner margin of secondaries, and the last is much covered with long white hairs; hind margin of primaries widely edged by black; of secondaries by a

black line, before which, at outer angle to median, is a black border like that of primaries; in the two median interspaces, next margin, a round black spot to each; sometimes an obscure similar spot in the next interspace above, but usually the black border extends quite to median; also at inner angle, in some examples, are traces of two small black spots; primaries have a black streak on arc of cell; fringes long, on primaries pure white externally, fuscous next margin, on secondaries white, with a few fuscous hairs at the end of the nervules.

Under side white, not quite pure, rather grayish, with a very slight tint of blue at base of secondaries; both wings have the hind margins edged by a pale brown line, crossed by two rows of black spots, one sub-marginal, the other extra-discal; these last small, and in the median interspaces of secondaries have on the posterior side small patches of fulvous; the inner row has usually rounded spots, but occasionally nearly all are elongated, disposed as in the allied species; on the arc of cell of each wing a rather large black bar; secondaries have three spots across basal area, one on costal margin, one in middle of cell, and one on inner margin; in addition to the above described spots is a common marginal row on primaries not clearly defined, rather pale brown discolorations than spots, on secondaries distinct, the outer ones brown, the rest black.

Body above covered by long whitish-blue hairs; beneath white, the thorax with faint blue tint; legs white; palpi white, with hairs in front tipped with black; antennæ black, with narrow white wings; club black above, ferruginous below.

Female.—Same size.

Upper side russet on disks to marginal borders; sometimes much obscured by darker brown; in one example under view the disks and whole surface are black-brown, with an illy-defined brown patch at inner angle; but this, as well as all others, have a fulvous sub-marginal belt on secondaries, on the marginal side of which are round black spots like those in male; in some examples the belt is diffused towards disk; primaries have the discal spot rather larger than in male; the fringes soiled white.

Under side brown-buff, uniform; marked as in the male, all spots rather larger; the thorax beneath gray, with many brown hairs; abdomen nearly color of wings.

The species is allied to *Sæpiolus*, Bd., as well as to *Icaroides*, and the plan of markings of under side is similar in the three. It differs from *Sæpiolus* most decidedly in color of upper side of male, the latter being of

a silvery blue (Bois. says *argento-cæruleæ);* and in the female the color of *Sæpiolus* is fuscous, with more or less blue at base.

Boisduval describes *Icaroides* as *subviolaceo-cæruleæ*, the ♀ *fuscæ*. For *Rufescens* ♂ he says shining blue, *nitide cæruleæ*. The former is of a dull violet blue, the fringes not pure white, rather ashen-white. The latter is metallic pruinose blue, as I see it, with white fringes, and these contrast prettily with the blue. Placed side by side there is no mistaking one of the males for another in those three species.

NOTES ON COLIAS CHRISTINA, Edwards.

BY H. H. LYMAN, MONTREAL.

Dr. Hagen, in his paper on the genus *Colias*,* recently published, discussing the species described by Mr. Wm. H. Edwards under the name of *C. Christina*, comes to the conclusion that it is merely a variety of *C. Edwardsii*, which. he regards as only a form of *C. Interior*, Scud., including also under the latter name, *Emilia*, *Astræa*, *Scudderi* ,*Alexandra*, *Occidentalis*, *Harfordii* and *Laurentina*.

I had the good fortune last year to receive from my friend, Dr. Robert Bell, of the Geological Survey, a series of fifteen specimens of this species, which, although not perfect, are very valuable for study ; collected at eight localities in the North-west Territories, extending over 250 miles of trail, the most south-easterly locality being Qu'Appelle, 50° 40' N., 104° 14' W., and the most north-westerly, Duck Lake, 52° 47' N., 106° 15' W. The series consists of 6 males and 9 females. Mr. Edwards described and figured one type of female which is apparently not the most usual one, in fact none of mine answer to the description given by him. The most usual form, as represented by six out of the nine, may be described as follows :

Expands 2–2¼ inches. A dwarfed specimen was only 1$\frac{13}{16}$ inch.

Upper side lemon yellow, slightly suffused with orange, especially on primaries, which have a broad marginal band enclosing a row of yellow spots, which are sometimes defined, but more frequently united into an irregular band. Discal spot generally larger than in the male, black,

* Proc. Bost. Soc. Nat. Hist., vol. xxii., p. 150.

sometimes enclosing an orange dot. Edge of costa rose red. Secondaries without any marginal border, but occasionally with a slight powdering of black atoms near the apical angle. Discal spot large, round, deep orange. A few black scales at the base of both wings. Fringes of both wings rose red. Beneath, greenish yellow, especially the secondaries, basal half of primaries suffused with orange, which does not reach the costa. Costal edge of both wings rose red. Costa and apex of primaries and the whole of secondaries sprinkled with fine black scales. Discal spot as above, but always with a yellow or orange centre. Discal spot of secondaries round, medium sized, silvery white, encircled with reddish brown. At the base of secondaries there is a small pink patch. Palpi yellow, or sometimes rosy at tip, legs rosy, antennæ rosy shaded with brown.

In one specimen the marginal band is almost obsolete, being only distinct on the costa, and with a slight shading of black scales about the ends of the nervules.

One specimen has three submarginal spots near the outer angle of the under side of primaries, the others have no trace of these spots.

Var A. ♀. Marked as in type described above, but albino, the color above and below being greenish white. Discal spot of secondaries above, orange. Two specimens are of this kind, but in one the marginal border is considerably reduced.

Var. B. ♀. Greenish yellow above, both wings very slightly suffused with orange, it being just perceptible on the secondaries. The marginal band only represented by a slight powdering of black scales at the apex. Discal spot of primaries small, oval, deep orange, that of secondaries large, round, and of the same color.

Below similar to ordinary type, with the exception that the orange flush is very slight, and that the discal spot of primaries is smaller and reddish brown.

The whole series of fifteen specimens shows very little variation apart from the albino female and the distinctness or partial obsolescence of the marginal band of the female, the Var. B. described above chiefly differing from the normal form in the absence of the marginal band and in having the discal spot of primaries orange ; but it is the only specimen I have which at all approaches the female figured and described by Mr. Edwards.

The arguments advanced by Dr. Hagen for considering *Christina* a variety of *Edwardsii* may be briefly stated as follows : The Entomolo

gists of the Northern Trans-continental Survey collected in 1882, in Oregon and Washington Territory, 129 specimens of *C. Edwardsii*, among which were two specimens like the one figured by Mr. Edwards as *Christina* ♀ ; other specimens with a faint beginning of a border were taken in copulation with *C. Edwardsii*, therefore the specimen figured by Mr. Edwards as *Christina* ♀ is *Edwardsii* ♀.

No orange male of *C. Edwardsii* has ever been reported, nor were there any among the specimens collected by Dr. Hagen and his associates, but one or two males of *Philodice* suffused with orange have been taken, and one orange male of *Pelidne* from Labrador is recorded by Moeschler ; therefore there is no improbability that a few may exist of *Edwardsii*, and therefore Dr. Hagen comes to the conclusion that *Christina* cannot be separated from *Edwardsii*.

Dr. Hagen also complains that Mr. Edwards, while admitting that *Philodice* varies " in size, in color, in the extent and contour of the marginal border, in the discal spots, in all the markings of the under side, and in the degree of dusting of both sides," nevertheless uses these same characters to separate the larger number of the American species of *Colias*.

Now, though it is admitted that a very large series of *Philodice* may show variations in all of these characters, it is scarcely reasonable to say that no weight should be attached to the fact that in one form nine specimens out of ten are without a certain character, which is present in nine out of ten specimens of another form. Dr. Hagen himself admits nine good species of this genus as occurring in North America, and he surely must use some of these characters in separating these species. At least I fail to see how otherwise *C. Interior* can be separated from *C. Philodice*. Besides it by no means follows that because two species of a genus may vary extremely, all the others will vary to anything like the same extent.

Mr. Strecker, in his illustrated work on Lepidoptera *, page 133, states that *Christina* is only a variety of *C. Pelidne*, and repeats the same in his catalogue.

Mr. Edwards has effectively replied to these statements on page 56, Vov. xiv., of this journal, but I may be permitted to make a few remarks on the same subject.

In the first place Mr. Strecker's geography is sadly at fault when he calls the region immediately west of Hudson's Bay the " New North and

* Lepidoptera, Rhophaloceres and Heteroceres, Indigenous and Exotic.

New South Wales districts of British Columbia," and defines the latter in the list of localities given in his catalogue as "comprising, with the exception of Alaska, all that part of North American north of latitude 49°."

If Mr. Strecker will consult a good atlas he will find that the name British Columbia is confined to the territory lying west of the main range of the Rocky Mountains, and of a straight line running from 55° N., 120° W. due north, and south of latitude 60° N. The remainder of this vast region, exclusive of Manitoba, being known as the North-West Territory of Canada.

I have never heard of the names "New North Wales" and "New South Wales" having ever been given to any part of British North America.

Apologizing for this geographical digression, I would return to a consideration of Mr. Strecker's reasons for considering these species identical.

He says that he has both yellow and orange males and yellow and white females of *Christina*, and that though expanding about a half inch more than *Pelidne* he can find no difference sufficient to separate them, and so regards them as the same species, with a tendency to orange color and great size on the western districts. Why a butterfly travelling westward should become changed from yellow to orange and increase in alar expanse by one third or more is not stated; he simply concludes that it does. However, from Mr. Edwards' remarks, referred to above, it is evident that Mr. Strecker has confounded two or three different species. Four of my specimens were sent to Mr. Henry Edwards for examination, and of them he wrote: "I confess I cannot separate No. 1 (a male specimen) from *C. Keewaydin* of the Pacific States; the females, however, seem different and the species may be good."

The characters which appear to me to separate this species from all forms of *Eurytheme* are as follows:

In *Eurytheme* and its varieties the female, so far as I know, have a distinct border on secondaries.

The females of *Christina* do not have this border.

In *Eurytheme* the sub-marginal spots below are generally distinct.

In *Christina* they are nearly always wanting, only two specimens, ♂ and ♀, out of fifteen showing traces of them.

In *Eurytheme* there is a brownish patch on the costa of secondaries below.

None of my examples of *Christina* have any trace of such a spot.

In *Eurytheme* the discal spot on underside of secondaries is nearly always double.

In *Christina* it is very rarely so, two specimens only out of fifteen having a very minute brownish dot without any silver alongside of the discal spot.

Eurytheme is heavily shaded with black scales at the base of both wings above, and also on both sides of the median nervure of secondaries and between it and the sub-median nervure, while in *Christina* there are generally only a few black scales at the base of each wing just around the thorax, the space between the median nervure and the abdominal margin being yellow. These points of difference may not be sufficient, and it is quite possible that *Christina* may prove to be a northern form of *Eurytheme*, though the occurrence of the true type of *Eurytheme* in this northern district, if a fact, as reported by Mr. Strecker on page 132 of his work referred to above, would militate against such a conclusion. However, at present the intergrades are lacking, and I hold that until these are forthcoming, or these two forms are proved by breeding to belong to the same species, we are entitled to regard them as distinct and to retain the name *Christina*.

I may add that the only other specimen of *Colias* in the collection made by Dr. Bell last summer, was a single male of *Philodice*, taken at Fort Carlton, 52° 51′ N. 106° 13′ W., which, while differing from the general type of that species in having a decidedly broader marginal band, is pronounced by Mr. Henry Edwards similiar to some specimens of that species from the Rocky Mountains.

ENTOMOLOGY FOR BEGINNERS.

SMERINTHUS EXÆCATUS AND MYOPS.

BY THE EDITOR.

Among the most beautiful of all the night-flying moths may be placed those belonging to the genus *Smerinthus*, one of the genera included in the *Sphingidæ*, or Sphinx moths, a name derived from a fancied resem-

blance some of the caterpillars bear in certain attitudes to the famous Egyptian Sphinx. This family comprises some of the most robust and powerful among moths. Dr. Harris thus speaks of them: "In the winged state the true Sphinges are known by the name of Humming-bird Moths, from the sound which they make in flying, and Hawk Moths from their habit of hovering in the air while taking their food. These Humming-bird or Hawk Moths may be seen during the morning and evening twilight flying with great swiftness from flower to flower. Their wings are long, narrow and pointed, and are moved by powerful muscles. Their tongues when uncoiled are for the most part excessively long, and with them they extract the honey from the blossoms of the honeysuckle and other tubular flowers while on the wing."

Fig. 1.

The Blind-eyed Sphinx, *Smerinthus excæcatus*, which is well shown in Fig. 1, is a lovely creature which measures when its wings are spread nearly three inches across. Its body is fawn colored, with a chestnut colored stripe on the thorax and a dark brown line on the abdomen. The front wings are fawn colored, clouded and striped with a rich velvety brown. The hind wings are rose colored in the middle, crossed by two or three short whitish lines, having a brownish patch at the tip and a black spot with a pale blue centre near the inner angle. The moth is on the wing in June and July; the eggs are laid on apple, plum and wild cherry trees, and the larva, Fig. 2, becomes full grown in September. It then measures about two and a half inches long, has a green triangular head bordered with white, and an apple green body, paler on the back, deeper in color along the sides, with seven oblique stripes on each side of a pale yellow color, the last one, of a brighter yellow than the others, extending

to the base of the horn. The skin of the body is roughened with numerous white-tipped granulations, and the stout horn on the hinder part of the body is of a bluish green color. This larva when irritated emits a peculiar musical chirping sound.

Fig. 2.

When full grown it buries itself in the earth, where it changes to a chestnut brown chrysalis, which is smooth, with a short, rough terminal spine. In this condition it remains during the winter, escaping as a moth early the following summer.

The life history of the Purblind Sphinx, *Smerinthus myops*, Fig. 3, is very similar to that of the species just described. It appears in the perfect state also in June and July. The moth is very handsome. The head and thorax are chocolate brown with a purplish tinge, the thorax is striped with yellow and the abdomen brown marked with yellowish spots. The fore wings are angulated and excavated on the hind margin, and are ornamented with bands and patches of black on a chocolate-brown ground. The hind wings are dull yellow with the outer half a rich brown, and have an eye-like spot towards the inner margin, black with a pale blue centre.

Fig. 3.

The caterpillar much resembles Fig. 2. It is green with two rows of reddish brown spots on each side and six oblique yellow lines, with two shorter lines of the same color on the anterior segments. The head is bluish green, margined with yellow, and the curved horn at the tail green, tinged with yellow at the sides. When full grown it measures about two inches in length, and is nearly cylindrical in form. It feeds on the leaves of the cherry tree, both the wild and cultivated varieties.

The insect passes the winter in the pupa state under the earth; the chrysalis is smooth and of a dark brown color. Both these insects are comparatively rare, and have never, as far as we know, appeared in sufficient numbers to prove injurious to the trees on which they feed.

PREPARATORY STAGES OF CATOCALA ILIA, Cram.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Diameter, .06 inch. Shape spheroidal, the transverse diameter being about one fifth more than the longitudinal; striated longitudinally with 28 striæ, 15 of these reaching the shallowly punctured apex, these ridges being crossed with a network of slight elevations, the transverse and the longitudinal lines in the middle of the hollows making squares, the interior of these squares being roughened, the corner of each square a little more elevated and enlarged than the sides. Color brownish olive. Duration of this period 234 days.

Young Larva.—Length .25 inch. Color pale gray, one prominent purplish black dorsal line and three less distinct lines on each side. Head purplish black, piliferous spots and hairs the same color. Venter paler than above, with a dark spot in the centre of each joint. Feet, 12. Duration of this period 6 to 7 days.

After 1st Moult.—Length .45 inch. Color pale gray, the markings dark reddish purple; dorsal line distinct, a wavy fainter line midway between this and the subdorsal. The subdorsal line and two others before reaching the lateral piliferous spots, distinct; through the stigmatal region two more or less continuous faint lines and a substigmatal distinct one, making in all 9 distinct and 6 faint lines. A dark ventral spot on joints 4 to 8. The stripes of the body continuous on the head, though darker. Thoracic legs dark purple, first and second pairs of abdominal legs beginning to develop. Hairs and piliferous spots dark reddish purple. Duration of this period 3 days.

After 2nd Moult.—Length .80 inch. The dorsal region in three stripes, the central rather pale gray with a dorsal line in its middle a little darker than the ground color. The outer stripe, reaching to the subdorsal, is blackish gray, not very dark except in places, interrupted on joint 4, the stripe bounded on each side by a wavy black line. The darker blotches in this stripe are between joints 4 and 5, 5 and 6, 8 and 9, and on the anal joint. The subdorsal region has two similar stripes, the upper pale with a central line like the dorsal, the lower line dark, the lower boundary line running through the stigmata. A substigmatal pale stripe has also a dark central line. Venter pale with the dark spots as before. The stripes are more or less continuous on the head. Piliferous spots small, hairs

short and black, the dorsal posterior pair of spots on joints 8 and 11 a little more prominent than the others. All the legs pale except at the tips. Duration of this period 3 days.

After 3rd Moult.—Length 1.30 inches. Color and markings about the same as before, the lines separating the stripes not quite so distinct. The head not striped continuous with the body, but is black across the top and down the sides, with a black parenthesis mark in front a little above the middle on each side; the rest pale. The head had these marks during the last period. The first and second pairs of abdominal legs developed so as to be used. Piliferous spots rather prominent, but concolorous with the body. Duration of this period 3 days.

After 4th Moult.—Length 2.00 inches. In color and stripes about the same as before, except the color has more of a pinkish tinge. The spiracles show more distinctly than before and are gray ringed with black; the stigmatal stripe or line a little more of black than the dorsal. The black stripes on the head are mottled; the one over the top of the head reaching down the sides two thirds of the way to the mouth, an unmottled black spot at the base of the jaws, another mottled stripe lower down from the jaws back. This is lower on the head than the one that runs over the top. Front of head and sides of face pale whitish mottled with pale pinkish gray. The 6 ocelli on each side black. Slight fleshy fringe along the sides.

Mature Larva.—Length 2.50 to 2.60 inches. Width of head .20 inch, the length about the same, width of middle of body .40 inch. The color of body gray in nine more or less distinct stripes, three dorsal and three on each side, the dorsal faintly purplish and the lateral faintly yellowish, the arrangement and boundaries of the stripes the same as above. The posterior dorsal piliferous spots to each joint are more prominent than the others, have a kind of horny look and slightly ochraceous tinge, all the spots partaking a little of this. Stigmata black. Venter rose, somewhat purplish with the dark spots in the centre of joints 4 to 8 and traces of these in the others. Legs pale, spotted a little. Ocelli black, jaws black, antennæ and palpi pale. Duration of this period from 6 to 9 days.

Chrysalis.—Length 1.45 inches, of wing and tongue cases, .80 inch, these reaching to the posterior part of joint 5. Width of thorax .45 inch, depth of thorax .40, depth of joint two, .40; joint three, .43; joint four, .42; joint five, .40 inch, from which it tapers in a cone backwards. The outside of the abdominal joints punctured, with the exception of the last two. Wing

cases, head and thorax finely rugose; a very slightly elevated median smooth line over the head and back of the thorax. Tip of the abdominal joint coarsely wrinkled and tipped with 8 hooks, the two outer the longest. Color dark brown covered over with white pruinescence. The cocoon is made, as in the other species, by fastening leaves together, lined a little with silk mostly where the tip of the abdomen comes and into which the hooks are fastened. Duration of this period 41 to 42 days from the time of spinning to yielding the imagines.

The eggs were deposited Aug. 15, 1882, by a single female that had been confined under a screen two or three days, 44 being obtained in all. They began hatching April 3, 1883, began pupating April 30, and the imagines appeared from June 8 to 11. This gives us a period of 297 days as a minimum of time from the egg to the imago, allowing the eggs to be deposited at the time of year these were. As the species occurs through the whole of the Catocala season, it is probable that the eggs are deposited at different times during the summer. I can not say whether they are single brooded or double, but am inclined to the opinion that there is only one brood in a season from the same parentage, and that the continual recurrence of individuals through the season is due to the difference in development of individuals from the same brood of eggs, and perhaps in part to the difference in time of depositing of the eggs. In a brood of eggs of *C. Amatrix* I found a month's difference between the first and last of hatching, so that I had larvæ in the first stage and mature larvæ at the same time. Only a few of the eggs of this species hatched, and of these only three passed through all their transformations. If a large number of eggs, as for instance all that may be deposited by a single female, in their hatching showed as much difference of time as did the *C. Amatrix* eggs, this would account for at least a month of the time this species is seen flying. All the species I have reared require about a month for the growth of the larva, and another month for the pupal period. If the different species are about uniform in this respect, then most of the species must be single brooded, for they do not have an average time of flying sufficient to allow of a second brood from the time of the appearance of the first specimens of the season till they cease flying. But the extra heat of summer may accelerate their development as it does other insects, and in that way give us more than one brood of some species, hence with *Ilia* and a few others the question of the number

of broods is still an open one, but it can hardly be with such species as *Illecta, Insolabilis* and many others.

The eggs were kept through the winter in a room away from any fire, but not allowed to freeze. At the time of hatching the temperature was about that of the open air. At this time the oak buds had scarcely begun to swell. These were cut open and the young larvæ ate readily of the interior, and in doing this showed a trait not noticed before in the genus. Instead of eating the edges of the folded leaves I had flayed up for that purpose, they bored into the centre of the buds, as often beginning on the outside scales as where there were cut places, and this they continued to do till the leaves had begun to expand. When the larvæ were two inches long the leaves of *Quercus coccinea* were only one inch long. I had before found larvæ of this species in the woods of this size, when the leaves were no further developed, and could not understand why they should be nearly ready to pupate when the leaves were only just coming out, but this trait explains it. They hatch during the first warm days of spring, when the buds begin to swell, and play the part of borers in these buds till the leaves are sufficiently expanded to enable them to eat from the edges of the leaves.

CETHERONIA REGALIS, Hubner.

BY FREDERICK CLARKSON, NEW YORK CITY.

On the 22nd of August, 1882, while entomologizing along the border of a wood at Oak Hill, New York, I was agreeably surprised by a call from a lady companion—an earnest devotee of the floral kingdom, who was but a few yards distant in the pursuit of her favorite study—that she had discovered something which she appeared to regard with that sort of honor which one might bestow on a venemous reptile. Knowing her dislike of all crawling things, I at once conjectured that the cause of the alarm was a spinous caterpillar, and that my attention, no, doubt, was being directed to that over which I at least would be enthusiastic. It proved to be the formidable looking larva of this moth, popularly known as the Hickory Horned Devil, and on account of its rarity, a goodly, and in no sense an evil sight to a naturalist. It was found feeding on the hickory. It burrowed a few inches into the earth on the 19th of Sep-

tember, to transform, and two days thereafter the pupa worked itself to the surface. The moth, which proved to be a ♂, appeared May 25th. On the 29th of August I found my second larva of this moth; it was full fed and conslderably larger at the time of pupation than the previous capture. It burrowed into the earth the same day, and a short time thereafter the pupa wriggled itself to the surface, the imago, a ♀, appearing on the 23rd of May. My third larva of this moth was received by post, September 1st last, from a friend at Clermont, New York, who informed me that it was found by his gardener, and was thought to be a great rarity, as that important functionary had declared that he had never seen the *likes* before. Strange that so ponderous a caterpillar should have escaped the gardener's more ponderous foot! Luckily it was not thought to be a snake, or for the love of St. Patrick he would have counted it among his squashes. It burrowed into the earth on the 6th of September, and in a few days the pupa appeared upon the surface. It would seem from these facts that it matters not at what time the larva pupates, the imago appears at the end of May. It is also made evident that the pupa remains upon the surface of the ground during the winter.

CORRESPONDENCE.

ON THE BREEDING OF LEPIDOPTERA.

On the 5th of December, 1883, I took from a room which had not yet been warmed up, this winter, a number of pupæ (Heterocera) of different species. These I took to a room having a warmth of from 64–80 degrees Fahr. (16–20 Reaumur), to ascertain the amount of warmth the different species of Lepidoptera need to reach the imago state, with the following success. On January 16th, '84, the first imago disclosed a fine specimen of *Hemaris tenuis*. On January 27th, another *H. tenuis* hatched in good condition; also a *Telea polyphemus*, and on February 4th a large female of *Apatela lepusculina* also disclosed. I have yet a number of pupæ exposed to the same warmth, and will report of further success.

A NOTE ON VANESSA (AGLAIS) MILBERTI.

In September, 1883, on a Thursday, I took a number of caterpillars of *Vanessa Milberti* on the common nettle, which were full grown. On

the morning following three were suspended and the same day pupated. On Tuesday next, when putting fresh food in the box for the few which had not yet pupated, I was astonished to see an imago of *V. Milbertii* in the box, and on examining I found the empty pupa case suspended on one side of the box. From that day they gradually hatched, until two weeks after I found the caterpillars quite a number of imagoes had disclosed; the balance I found, after waiting another week, to have died in the pupa state. What do you think has been the cause of such a hurry?

WILLOW AND POPLAR, ALSO FOOD PLANTS OF PAEONIAS (SMERINTHUS) EXCÆCATA.

Last fall (1883) I found the larvæ of a Sphinx quite abundant on willow, which were unique in color and markings, with the caterpillar of *P. excæcata*. Reaching home I put them on the same kind of plant in my garden. I then also took some caterpillars of *P. excæcata*, which I had found feeding on linden, and tied them in a gauze bag on a willow branch, on which they readily fed and afterwards pupated, this assuring me that the first mentioned were of the same species. Early in August I also found a number of small caterpillars of the same species on poplar *(P. monolifera?)*, which I also fed on willow and on linden. The caterpillars of *P. excæcata* have been very abundant here last season, on willow, whilst *Sm. geminatus*, which I have not yet noticed on any other plant, has been very scarce.

In Vol. iv., No. 2, p. 62 of the Bulletin of the Society of Natural Science, Buffalo, N. Y., I stated in an article never to have caught the imago of *Darapsa myron* on strings of dried apples, soaked in stale beer and sugar; this I wish with this to recall, as I caught a specimen on it last season. *D. versicolor* and *D. choerilus* especially come frequently, and have been taken by me quite often.

PH. FISCHER, 528 High St., Buffalo.

Dear Sir,—Mr. John D. Evans, on page 237, describes an unusual gathering of Coleoptera on the shore of Weller's Bay, and desires to know if others have observed similar instances. On 3rd June last, I saw an almost equally numerous collection of insects near this city, between the Chaudiere Falls and the Canada Pacific Railway bridge across the Ottawa. A long boom-log fixed almost at right angles to the shore, formed with it a pocket into which were swept by the swift current chips, bark and other

small drift-wood. The accumulation was literally swarming with insects which had evidently fallen, or been blown, into the river, and had sought safety upon the drift-wood floating with them. Having floated into a haven of refuge, they were crawling upon the most elevated places and drying themselves in the sun preparatory to flight. In many instances, however, they were doomed to disappointment, as sudden changes in the current and eddy would every now and then violently agitate the accumulation, wash off many of the insects, and send portions of the drift-wood again into the current to be carried further down. Beetles were most numerous, but there were also large numbers of Diptera and some Hymenoptera and Hemiptera. The Coleoptera were principally comprised of Chrysomelidæ, Coccinellidæ, Histeridæ, Nitidulidæ, Lampyridæ and Staphylinidæ, and were generally the smaller and commoner species.

Ottawa, 18th Feb'y, 1884. W. Hague Harrington.

THE DUNG PELLET MAKERS.

BY FREDERICK CLARKSON, NEW YORK CITY.

The term Scarabaeus, as applied by the ancients to the Sacred Beetle of Egypt, and afterwards by Linnaeus as comprehending the great division of the Lamellicornes of Latreille, is derived from Khepra, an African word, which means cipher or circle, and has reference to the orbicular shape of the pellet of dung that contains the deposit of ova. Khepr is no doubt the root word, and is analagous with the Greek word Kapobos, the Latin word Scarabaeus, and the English word Crab. Any ordinary scholar can follow the slight linguistic change that produces one from the other. The Scarabaeus is imaged amongst the hieroglyphics of the Egyptians, and was regarded by those ancient people as a symbol of the world and the sun. It is not improbable that the term Scarabaeus is associated in the minds of the many with the idea of a Crab, not only because the Sacred Beetle of Egypt is represented under that form, as a sign in the zodiac, but also from the peculiar conformation of the clypeus and thorax of the beetle to the shell-case of that Crustacean. Scarabaeus evidently means a ball. It seems to the writer that we apply this term to cover a larger class of beetles than the signification of the word will admit.

This article, however, is not intended to suggest any limitation in the classification, but merely to ascribe to these indefatigable laborers the designation which they have earned in the very infancy of human observation.

BOOK NOTICES.

Bulletin of the United States National Museum, No. 22. Guide to the Flora of Washington and vicinity. By Lester F. Ward; 8vo., pp. 264.

This is the twenty-sixth of a series of papers intended to illustrate the collections of natural history and ethnology belonging to the United States and constituting the National Museum at Washington. In the introductory remarks which precede the list proper, the author gives a great deal of useful general information relating to the Flora of Washington and vicinity. In the list the common as well as botanical names of the plants are given, with dates of flowering and localities for the rarer species. This general list is followed by a check list, including 1,384 species. The report closes with an instructive appendix in which many useful suggestions are given to beginners in the study of botany.

Proceedings of the American Society of Microscopists; 6th meeting held in Chicago, August, 1883; 8vo., pp. 275.

We have been favored by the Secretary, Dr. Kellicott, of Buffalo, with a copy of the above work, which contains a number of very interesting papers on natural history and other subjects. So energetic an organization as the American Society of Microscopists cannot fail to greatly stimulate microscopic research in all directions in this country. The volume referred to gives abundant evidence of the good work being accomplished.

The Number of Segments in the Head of Winged Insects. By Dr. A. S. Packard.

We are indebted to the author for a copy of this paper, recently published in the *American Naturalist*.

A Revision of the Lysiopetalidæ, a Family of *Chilognath Myriopoda*. By Dr. A. S. Packard.

In studying the cave fauna of the United States, the author of this paper found it necessary to work carefully over the structure of the Myriopoda. In this paper he gives a systematic account of the genera and species pertaining to this group, describing also the characters of a new genus, *Cryptotrichus*, followed by a chapter on the Morphology of the Myriopoda, with a plate illustrating the mouth parts.

The North American Species of Conops; by S. W. Williston. From the Transactions of the Conn. Academy; 8vo., 18 pp.

In this paper the American genera included in the Conopidæ are tabulated, also the described species belonging to the genus Conops. Following these tables are descriptions of six new species.

Cold-blooded Vertebrates and Lepidoptera of Wisconsin; by Dr. P. R. Hoy. From the Report of the Geological Survey, lge. 8vo., 30 pp.

Our thanks are due the author for the above paper, containing a very full list of Wisconsin Lepidoptera, followed by one of Reptiles and Fishes.

Human Parasites; by Dr. F. W. Goding. From the Chicago Medical Journal and Examiner for Dec'r, 1883.

In this paper the author notices all the different species of parasites known to affect the human body both internally and externally, grouping them in accordance with the latest system of classification, and briefly giving the life history of each species as far as known, adding the appropriate remedies and methods of treatment for each. The list is a formidable one and goes far to confirm the statement made by the author in his introductory remarks, that "scarcely any portion of the human body is free from parasites, and each organ and system has its own special parasites."

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NOTES ON SPHINGIDÆ CAPTURED AT ORONO, MAINE, AND VICINITY.

BY MRS. C. H. FERNALD.

Lepisesia flavofasciata, Barnst.—Very rare, taken in the hottest part of the day, on lilac and apple blossoms; also on *Amelanchier Canadensis*.

Hemaris diffinis, Boisd.—Common on Tartarian honeysuckle and lilac, in the middle of the day.

Hemaris gracilis, G. & R.—Quite rare, found on the same flowers and at the same time as *H. diffinis*, and also flies about sunset.

Hemaris thysbe, Fabr.—Very common, flying in company with *H. diffinis*.

Amphion nessus, Cram.—Quite common in company with the last named species.

Deilephila chamænerii, Harris.—Some seasons quite common on Tartarian honeysuckle and lilac, at twilight.

Deilephila lineata, Fabr.—Taken on *Œnothera Lamarckiana* just after sunset, in September.

Philampelus pandorus, Hübn.—One example bred from larva on grape vine.

Philampelus achemon, Drury.—Larvæ found on grape vine, but failed to emerge.

Everyx chœrilus, Cram.—Rare, at sugar, in July.

Smerinthus geminatus, Say.—Quite common at light, in June.

Smerinthus cerisyi, Kirby.—Very rare, at light, last of May.

Paonias excæcatus, A. & S.—Quite rare, at light, in June.

Calasymbolus myops, A. & S.—Two examples taken at light.

Triptogon modesta, Harr.—Rare, at light, first of July.

Ceratomia amyntor, Hübn.—Quite rare, on climbing honeysuckle.

Daremma undulosa, Walk.—Quite common, at light and on flowers in June.

Phlegethontius cingulata, Fabr.—Two examples on flowers of *Nicotiana affinis*, quite late in the evening, in the first of Sept.

Sphinx drupiferarum, A. & S.—Common at light, and on several kinds of flowers.

Sphinx Kalmiæ, A. & S.—Found with *S. drupiferarum*.

Sphinx chersis, Hübn.—The most common Sphinx in this locality; taken at twilight on *Œnothera Lamarckiana* and *Nicotiana affinis;* also bred on ash; July.

Sphinx gordius, Cram.—Found on lilac and Tartarian honeysuckle, early in the evening.

Sphinx luscitiosa, Clem.—Rare, on climbing honeysuckle, at twilight.

Dolba hylæus, Drury.—Rare, on Œnothera and honeysuckle, at twilight.

Ellema Harrisii, Clem.—Rare, on honeysuckle, at twilight; also at light, in June.

ABNORMAL SPECIMEN OF THE GENUS SAMIA.

BY W. F. KIRBY, LONDON, ENG.

This remarkable specimen, which has puzzled every entomologist who has seen it, was bred by M. Alfred Wailly from a cocoon received from some part of North America. It may be a hybrid between *S. cecropia* and some other species, but if so, it is so different from all the other known species, that it is difficult to guess with what it could have been crossed. It is equally difficult to imagine that it is a new species. The specimen is a female, and equals the largest specimens of *S. cecropia* in size, measuring fully 6¾ inches in expanse; and the wings are more rounded and less oblique than in *cecropia*. The body resembles that of *cecropia*, except that the abdomen is banded with yellowish gray and black. The base of the fore wings is brown, thickly scaled with white towards the costa; below this is a brick-red blotch, longer and narrower than in *cecropia*. Beyond this is a white space, extending nearly from the base to one third of the length of the wing on the inner margin, but curving up to the costa in a rather narrow stripe. This is followed by a large irregular black blotch, broad at the costa (where it is thickly dusted with gray) and the narrow end extending to beyond the middle of the wing. On this stands the large white kidney-shaped central spot, which is surrounded with red, and divided by a reddish stripe at the outer end of the black blotch; it extends beyond it into a broad red white-dusted band, followed by a black one, so very thickly dusted with yellowish gray that it appears of that

color. This is succeeded by a gray space, divided by a black line (much less indented than in *cecropia)* into darker and lighter; above is a lilac space; on the inside is a row of rather large spots, the uppermost and the 4th and 5th being the largest. Hind wings white at the base, followed by a broad dark slate-colored space, on the outer half of which stands a large oval white spot, slightly surrounded with red, the outer part being incomplete, and it rests on a white band, much broader than in *cecropia*, followed by a broad red band, 3 or 4 times as broad as in *cecropia*, but followed outside by similar markings, only paler. The under surface differs from *cecropia* chiefly in the much paler color, and in the different position of the central spots.

[Mr. Kirby has kindly sent us a beautiful colored plate, prepared by Mr. Wailly, of this very interesting insect.—Ed. C. E.]

NOTES ON A VARIETY OF ANTHEREA (TELEA) POLYPHEMUS.

BY ADOLPH CONRADI, BETHLEHEM, PA.

During the early part of last spring I obtained from a small maple tree three cocoons of *Anth. polyphemus*. In due time two fine females made their appearance, and a few days later, on examining the box again, I found suspended from the lid (wire gauze) a black looking specimen, which at first sight appeared to be a ♀ *prometheа*. On closer inspection, however, I found it to be a beautiful aberration of *Anth. polyphemus* ♂. As it is the first one I ever found or heard of during nearly twenty years' collecting, I send you herewith a meagre description, which may be the means of bringing another specimen like it to the notice of the entomological world.

Antherea (Telea) polyphemus, L., var. ♂.

Antennæ very dark brown. Thorax and body a shade darker. Ground color of primaries same color. Upper margin gray with minute white spots. A white band running near outer margin from the base to tip of wing, terminating in a black oblong spot, surrounded by an irregular white narrow band. In the centre of primaries another very dark line running from upper to lower margin. Towards the inner margin an irregular white line, shaded with black. Near the centre there is an ocellate, transparent

spot, bordered with a double ring of ochre and blue. Secondaries, ground color same as primaries. with a narrow marginal white band bordered with blue. In centre there is an ocellate transparent spot bordered with ochre, shaded towards the inner margin with a blue spot, the whole surrounded by a black band terminating in a white line towards the inner base. Raised from the cocoon taken in spring of 1883.

SPINNING CATERPILLARS.

BY FREDERICK CLARKSON, NEW YORK CITY.

Milton, when he wrote of Nature's bounty, and referred to the

> . . . . "Millions of spinning worms
> That in their green shops weave the smooth-hair'd silk,"

had thoughts no doubt of the obedience due from Nature's subjects to Nature's King. A work ordered and a work performed. Were men as loyal to their King, what a garment of righteousness would each man weave wherein to appear, amid the flood-light at the Court on high! The caterpillar, at the sighing of the autumnal wind, enfolds itself in its silken shroud, preparatory to a winged flight, leaving to the world the record of a life well spent—an unbroken thread of duty done: a treasury of silk to deck the sons of men

> "In courts, in feasts, and high solemnities."

To grace man's outer life, and if in proper mood and contemplation, his inner life as well; for Nature's lessons are not learned under their external forms, but under the spiritual beauty and verities they represent.

> "That not a natural flower can grow on earth
> Without a flower upon the spiritual side,
> Substantial, archetypal, all aglow,
> With blossoming causes—not so far away
> That we, whose spirit-sense is somewhat cleared,
> May not catch something of the bloom and breath."

Nature has many voices. She speaks to us in joyful song amid the activities of the day, and in saddening dirges during the still hours of the night, while throughout her wide domain, in song of life and dirge of death, she whispers Resurrection.

Among the multifarious forms of insect-architecture, all of which are of absorbing interest, I purpose at this time to record a few notes relating

to the cocoons of the Bombycidæ. The cocoon made by the Worm of the Orient has, from the circumstance that its silk is so extensively used in manufacture, been fully described. This paper concerns those of the Polyphemus, Cecropia, Cynthia, Luna and Promethea caterpillars, and it may be regarded as an endeavor to foster an organized system of silk culture with these worms, the Cynthia worm especially favoring cultivation, as it is double brooded, and since its introduction from the East, together with its food plant, the Ailanthus, it has become largely distributed throughout the country. The habitat of some of these species is co-extensive with the Union, and silk culturers are alike advantaged in every section of the country with an abundance of food plant in our native trees. The silk produced by them, though not of as fine a texture as that spun by the Mori Worm, is yet abundant and of much greater strength. Notwithstanding the fact that the pointed end of the cocoons of the Cecropia, Cynthia and Promethea worms is left open for the exit of the moth, the threads are unbroken and the cocoons can be unwound. The Mori Worm covers the interior lining of the cocoon with a gummy secretion, and when the moth escapes, the threads, if not broken, are thought to be in such danger that cultivators of silk destroy the pupa before the period of emergence. There are Entomologists, however, who deny that the threads are broken at all, for they admit having succeeded in unwinding cocoons from which the moths have escaped. The Cecropia, Cynthia and Promethea worms line each layer of silk, as well as the interior of the cocoon, with a gummy secretion, leaving the silk at the exit opening free of agglutinating properties. This allows of a ready escape of the imago without danger to the thread. If the cocoons of these worms be divided lengthwise, and immersed in boiling water for a few seconds, a careful manipulation will permit the separation of the several layers of silk, when, by the aid of a lens, the life work of the caterpillar is beautifully presented and the continuity of the thread can be discovered. The exterior section of the cocoons of the Cecropia and Cynthia worms can be easily divided into three layers of silk, while the interior portion is divisible into six. The Luna and Polyphemus worms construct cocoons somewhat similar to the Mori Worm, and as all parts of the interior lining are sealed, it becomes prudent, perhaps necessary, to destroy the pupa.

NOTES ON THE LARVA OF PANTOGRAPHA LIMATA, Grote.

BY PROF. C. H. FERNALD, STATE COLLEGE, ORONO, ME.

On the 27th of September, 1882, while riding through Mt. Hope Cemetery, near Bangor, the leaves on several trees of Basswood *(Tilia Americana)* were observed to be rolled in a peculiar manner, and to contain a green larva with a black head, which I supposed at the time to be that of some Tortricid; but it quite puzzled me, as it was larger than the larva of any Tortricid in this region with which I was familiar. Miss Murtfeldt, who was riding with me at the time, said that she had seen the leaves of Basswood attacked and rolled in precisely the same manner in Minneapolis, but failed to secure any of the larvæ.

A large number of the rolled leaves were obtained and brought home from Mt. Hope, but the larger part of the larvæ had been destroyed by parasites or had escaped from their domiciles. Miss Murtfeldt took home with her a part of those remaining, but they failed to emerge. Of those which I retained, three pupated, one Oct. 10th, and the others a little later. They were kept in a warm room, so that without doubt the results are not the same as would have taken place out of doors. The one which went into the pupa state Oct. 10th, emerged Nov. 3rd, and proved to be *Pantographa limata* Gr. A few days later another emerged, but was crippled. The third failed to emerge either then or the following summer.

I have little doubt that if left to themselves they would have changed to pupæ among the leaves on the ground, and remained in this state during the winter, emerging the next season; for no thoughtful insect would emerge in such cold weather as we usually have here in November, but the facts must be learned hereafter.

The larva cuts the leaf across from near the middle of the side, past the midrib nearly an inch, in the larger leaves. This cut, which is about an eighth of an inch wide, first starts directly across the leaf, then curves gradually towards the apex, then back to the former direction, so that the entire cut is nearly in the form of the letter S, somewhat straightened out. The part beyond the cut is rolled over so as to form a cone with the apex towards the base of the leaf, and when enclosing a larva, both ends are turned in, so as to close the openings. In drawing the parts of the leaf together, the larva spins the thread from side to side—from the side of the cone to the surface of the leaf beyond, about forty times in a place before moving to another. The second set of threads, which is from a fourth to

a half an inch from the last, frequently draws the parts of the leaf together so much that the threads of other bundles hang in a loop. The larva deposits its excrement within the cone, towards the larger end.

The full grown larva is 25 mm. long, when at rest, and 30 when in motion; fusiform and somewhat stout in proportion to the length.

The body is pea green, about the color of the under side of the leaves of Basswood. The usual warts are present, of a dull brownish color and emitting pale hairs. The head, thoracic shield and legs are pitchy black, while the mouth parts are a little lighter, and there is a small black spot on each side of the first segment back of the head, just in front of the spiracle. The anal plate is dull brownish.

When preparing to change to the pupa state, the larva draws a portion of a leaf around it, lining it with silk, thus forming a delicate cocoon.

Three species only are at present known in the Pyralid genus *Pantographa*. The first two, *scripturalis*, of Brazil, and *anastomosalis*, of Java, were described by Guenee under the genus *Pionea*, the second one with doubt, and there was even doubt as to the locality. When Lederer made his revision of the *Pyralidæ* of the world, he established the genus *Pantographa* for these two species. Later, Mr. Grote described the species *limata* from North America, and I must confess that it is wonderfully near the Brazilian *scripturalis*, and may eventually prove to be the same species.

While the imago of *Pantographa limata* Gr. is a typical Pyralid, the larva is so very much like Tortricid larvæ, both in structure and habits, that I unhesitatingly referred it to the *Tortricidæ* till it emerged, and I could discover what it really was.

WEEVIL VERSUS CURCULIO.

BY W. L. DEVEREAUX, CLYDE, N. Y.

Curculio is an ancient Roman word, not at all used to denote a plum insect. It is slightly difficult to pronounce, and it certainly fails to inform the popular mind as clearly as the suggestive old Anglo-Saxon word, "weevil."

Weevil, in its original and right use, designates only insects of the snout-beetle kinds, like the plum weevil, bean and pea weevils, corn or

granary weevil, rice, pine, nut, water, and other weevils. Perhaps the only erroneous use of weevil made in this country was with the little yellow maggot of the wheat fly.

Entomologists most often write *plum weevil*, and pomologists use *curculio*, which is the name generally used by farmers and others. Evidently this name was adopted from its scientific generic title, as then known in the early part of this century, but almost before its adoption into common parlance, it was removed from scientific nomenclature. Had it not been introduced then, it would hardly be found in the English vocabulary now. It is in use nowhere else at the present time, being an obsolete technical word, known only in the books of the earlier writers on insects; and in its original use by Pliny and the Latins, over 1800 years ago, it was applied to the corn worm, which by the English was called *weevil*, and by the French *calendre*, since Latinized into *Calandra* by Clairville for the name of a genus, containing our corn and rice weevils.

The word *curculio* reached its greatest ascendancy when Linnæus, 120 years ago, transferred the name from the Romans into his natural system, employing it in a generic sense to designate all snout beetles.

Westwood,* in 1839, states that "In this tribe of insects, as elsewhere, from the multiplicity of named groups into which the old Linnæan genus has been separated, without the adoption of any principle regulating the retention of the old generic name, it has been entirely sunk, so that we find no modern genus *Curculio*."

It has, however, been retained by some classifiers for a few beetles, not including the plum weevil, until now, while all writers employ a family name, *Curculionidæ*.

The plum weevil was first described by Herbst, in 1797, under the name *Curculio nenuphar*. The specific name *nenuphar* is the French name for the great European water lily *(Nymphæa alba)*.

About 1830, Schonherr erected the genus *Conotrachelus*, meaning conical thorax or throat. At the abandonment of the name *Curculio*, our plum weevil fell into this genus, and hence is known as *Conotrachelus nenuphar*, Herbst.

There are about thirty species of *Conotrachelii* in N. America, all agreeing in structure quite closely with the plum *Conotrachelus*. The

* Westwood, Introduc. Mod. Classif. Insects, I., p. 348.

butternut weevil appears so closely like it that it has often been pronounced a large plum weevil.

No other member of this genus has been found attacking as many fruits as this plum weevil. Most species confine their depredations to a single kind of plant, like the quince weevil, *Conotrachelus crataegi*, which deposits its eggs in that fruit. The plum weevil is, however, a general fruit weevil, attacking, with only an occasional marked preference, every species of fruit in the botanical genera, *Prunus*, *Pyrus*, *Cydonia*, and some other species in other genera of the Rose family; and Miss M. E. Murtfeldt states* that she has bred them from gooseberries. In this connection it is singular that the grape has not suffered from its crescent thrust. Finally, from its habit of breeding in the "black knot" of the plum, it must be considered the most omnivorous of all the 1050 species of weevils now known in N. America.

LIFE HISTORIES OF FIVE SPECIES OF SCOPELOSOMA.

BY ROLAND THAXTER, KITTERY POINT, MAINE.

During the spring of the past year I was fortunate enough to procure eggs of the following species of *Scopelosoma*, and succeeded in rearing a sufficient number of each to ensure an accurate observation of their larval differences. The matter is of some interest, as it settles beyond question the specific difference between the two species known in collections as *S. Walkeri* and *S. vinulenta*, which have been enumerated as varieties of the mythical *sidus* in recent lists. That one of these species is really *sidus* I think there can be little doubt; but which should be referred to it is somewhat uncertain.

My friend, Mr. Chatfield, has had the kindness to send me for comparison with my own material, a specimen of a *Scopelosoma* taken by him at Albany, which, he informs me, has been pronounced by Mr. Grote to be with little doubt "a veritable *sidus*." On comparing my material of *Walkeri* (determined thus by Mr. Grote) with this specimen, I find no essential differences between the two, Mr. Chatfield's specimen being somewhat more clearly marked and darker than usual, and most decidedly not "d'un rouge de brique * uni, avec les lignes a peine distinctes."

* Rept. Entomologist U. S., C. V. Riley, 1881–1882, p. 66.

If Mr. Grote is correct in referring this specimen to *sidus*, we must consider *Walkeri* as a synonym. A comparison of *Walkeri* and *vinulenta* with the European *satellitia* and Guenée's description of *sidus*, leads me, however, to think that the latter species may be more properly identified with *vinulenta* than with *Walkeri*, for in *vinulenta* only are the primaries noticeably broader and shorter and more rounded at the apex than in *satellitia;* and the even brick-red color is very characteristic of *vinulenta*, while *Walkeri* has a decidedly purple cast, blackish in Mr. Chatfield's specimen, with the lines much more distinct. For these reasons I feel very decidedly inclined to consider *vinulenta* = *sidus*, although I retain the old name in speaking of this species in the following descriptions.

The larvæ of these five species all have the same form and habit; are omnivorous, and live in a case between two leaves, or within the fold of a single leaf—when young making a silk-covered burrow between two ribs or eating out a cavity in a bud somewhat after the manner of a Tortricid. When fully matured and somewhat soiled, it is hardly possible to separate the species. *Devia* and *vinulenta* are very nearly related in this (the larval) stage, and separable at a glance from the others, when in good condition. *Tristigmata* is readily separable from the two remaining species by the yellow tinge of the lateral line, which I found characteristic of all, without exception, of a very large series of specimens. *Morrisoni* and *Walkeri* are the most difficult to separate, but the more even and richer color of the sub-dorsal and dorsal regions, together with the obliteration of the dorsal and sub-dorsal lines and the clear white lateral line, render the latter species sufficiently recognizable when fresh. The lateral lines are substigmatal, the stigmata black, the body sparsely covered with minute tubercles bearing short colorless hairs in all the species. Form cylindrical, tapering very slightly, head moderate.

Scopelosoma Morrisoni, Grote.

Eggs laid on oak twigs April 22. Straw color changing to reddish; flattened inferiorly, a central superior depression from which radiate beaded ridges. Transverse diameter about .6 m m. Hatched May 4.

First Stage.—When just hatched, color livid yellowish green with blackish superior and anterior tinges. Head large, jet black. Legs and prolegs black. A frontal semi-circular black plate on seg. 1. After feeding and when nearly grown, indications of a dorsal, sub-dorsal and lateral streak. Color light green, darker superiorly. L. 2–3 m m.

Second stage May 15. Above dull purplish, darker in the subdorsal region, with a greenish tinge. Dull yellowish inferiorly, except on segments 1–4, which are tinged with purplish. A dorsal, two sub-dorsal and a sub-stigmatal whitish line, the two sub-dorsal ones less clearly marked, especially the inferior. Setiferous tubercles, which bear short colorless minute hairs, blackish, indistinctly ringed. A few whitish mottlings between the longitudinal lines. Stigmata blackish, indistinctly ringed. Legs and prolegs black. L. 6 m m.

Third stage May 22. Much as before; the markings more distinct, especially the dorsal and lateral lines. Purple shades most prominent in region of stigmata. L. 10 m m.

Fourth stage May 28. Color above and below on segments 1–3 dull purple tinged with green dorsally. Below light greenish; a patch of purplish in the sub-stigmatal region of each segment. Dorsal line with a bluish tinge. Head light brown. L. 16 m m.

Fifth stage June 2. Marked as before, but less distinctly. Colors duller and darker. L. 25 m m.

Sixth stage June 8. Mature larva. Dull blackish with a slight bluish green tinge and lateral dull purplish shades, obscurely mottled. Dorsal streak indistinct, bluish white, somewhat irregular. Sub-dorsal lines broken, but tolerably distinct, the superior edged with blackish. Lateral streak white with a bluish tinge. Stigmata black. Setiferous tubercles minute, black, ringed with bluish white; those below the lateral line more distinct. The superior sub-dorsal line cuts the frontal plate of segment 1 very clearly, and is there tinged with yellowish. Rather stout, slightly tapering. L. 35 m m.

Scopelosoma Walkeri Grote.

Eggs as in *Morrisoni*. Laid April 25; hatched May 6.

First stage May 6. Not separable from *Morrisoni*.

Second stage May 16. Not separable from *Morrisoni*.

Third stage May 23. Somewhat darker than *Morrisoni*, and more distinctly purplish. Head much darker and inferior sub-lateral line less distinct. But varies so as to be hardly separable.

Fourth stage May 29. Somewhat darker and less distinctly marked than *Morrisoni*.

Fifth stage June 5. Much darker than *Morrisoni* and more evenly colored, being of a rich, velvety black-purple. The sub-dorsal lines

hardly visible. The lateral line clear, contrasting white, tinged with purple on segments 2 and 3. Setiferous tubercles smaller than in *Morrisoni.*

Sixth stage June 10. Mature larva much darker and more richly colored than *Morrisoni.* Above velvety black with a purple shade and some greenish tinges. The dorsal and sub-dorsal lines barely indicated. Setiferous tubercles barely visible, those below the lateral line more distinct. Lateral line clear white, contrasting, somewhat obliterated on segments 2, 3, 4, 11, 12. Superior sub-dorsal line is clearly marked through frontal plate of segment 1, and is tinged with yellow. Beneath bluish green. The sub-lateral region has a few pinkish shades, as does the ventral portion of segments 1 to 4. Form somewhat stouter than *Morrisoni.* Head more broadly edged posteriorly with light brown. L. 30 m m.

Scopelosoma vinulenta Grote.

Eggs as in *Morrisoni.* Hatched May 9.

First stage May 9. A little lighter than the two preceding species, but hardly separable.

Second stage May 18. Light green with slight lateral purplish shades. Head black.

Third stage May 24. Purple shades, except on segments 1–4, confined to the region included by the lateral and superior sub-dorsal lines. The inferior sub-dorsal line hardly visible. Dorsal parts distinctly blue-green. A continuous whitish dorsal line, broader, though less well defined than in *Morrisoni* of same stage. Beneath light green. Head light brown, darker anteriorly. L. 10 m m.

Fourth stage May 30th. Much as before; the purple duller and clearly defined. Dorsal and lateral lines more distinct. Inferior sub-dorsal line merely indicated by a few whitish mottlings. Head shining brown. L. 16 m m.

Fifth stage June 6th. Darker. Dorsal parts tinged with purple. Lateral line distinct, whitish contrasting above. Beneath light bluish green with purple tinges on segments 1–4. Sub-dorsal line visible on segments 1–3. Head more red brown L. 25 m m.

Sixth stage June 13. Mature larva. Dorsal portion dark olive green mottled with darker shades. Region between superior sub-dorsal and lateral lines dirty wine color, somewhat mottled. Dorsal and superior sub-dorsal lines moderately distinct. Inferior sub-dorsal line marked by a

few dots. Lateral line less distinct and suffused with purplish. Beneath livid; red-purple on segments 1–4. L. 32 m m.

Scopelosoma tristigmata Grote.

Eggs as in *Morrisoni*, laid April 24.

First stage May 5. Not separable from *Morrisoni*.

Second stage May 16, third stage May 22. In neither separable from *Morrisoni*.

Fourth stage May 28. Colored and marked as in *Morrisoni*, but the colors decidedly brighter and the lines and setiferous tubercles more distinct. L. 15 m m.

Fifth stage June 3. Somewhat lighter and more clearly marked than *Morrisoni*. The setiferous tubercles of dorsum decidedly larger, affording a reliable character for separation in this stage. L. 25 m m.

Sixth stage June 8. Mature larva. Much like *Morrisoni* and readily mistaken for it, but differing in the richer color, the more indistinct dorsal and sub-dorsal lines; but especially by the lateral line, which is broader posteriorly, and differs in every instance by a distinct orange-yellow tinge, which, though not particularly noticeable, is never present in *Morrisoni*. Moreover, the superior sub-dorsal line does not extend to the head, and is much less distinct. L. 30–35 m m.

Scopelosoma devia, Grote.

Eggs as in *Morrisoni*.

First stage. Milky white. Head, legs, prolegs and anterior plate of segment 1, black. L. 2 m m.

Second stage. Milky white, clearer than before. Setiferous tubercles black. A faint purplish lateral and dorsal tinge.

Third stage. Much as in the same stage of *vinulenta*, though paler.

Fourth stage. Paler than any of the preceding species, but nearest to *vinulenta*, from which it differs by a tolerably distinct sub-dorsal line, and by the absence of any purple shades on segs. 1-3, except above the lateral line, which is white. Dorsum light bluish green, mottled with whitish. Beneath very light colored. Prolegs black. Head black anteriorly, brown posteriorly.

Fifth stage June 10. Very near *vinulenta*, but much paler. Above greenish white, with a bluish tinge and darker olive shades. Dorsal and superior sub-dorsal lines distinct, contrasting with their edging of dark olive. The region between the superior sub-dorsal and lateral lines is

dark dull olive green, tinged with purple; darker inferiorly, with a few white dots. Lateral line broader than in *vinulenta*, but less clear. Purple tinges at base of prolegs, which are black. Head much lighter than *vinulenta*, black anteriorly.

Sixth stage June 15. Nearest *vinulenta*, but a darker or blacker looking larva. A broad dorsal blackish band attenuated intersegmentally, and including the hardly visible median dorsal streak, which terminates in an oblong spot on anal segment. The remainder of dorsal surface is mottled greenish, gray and blackish. Superior sub-dorsal line broadly edged with black; but inconspicuous, except on first and last segments. Lateral line broad, more or less clearly defined, whitish, with blackish shades. Beneath light greenish. Else as in preceding stage. L. 30 m m.

The larvæ of all these species entered the earth during the second and third weeks of June, spinning a slight cocoon, in which they remained without changing until August, the imagoes appearing during the first week of September. The pupa is light yellow brown, rather short and stout. The larvæ of *devia* were more delicate than the others, and only a few were brought to maturity and inflated, so that no imagoes were obtained.

Although *Morrisoni* and *vinulenta* are such abundant species in most localities, I have but once found the larva of any *Scopelosoma* when collecting, and I now recognize this to have been *vinulenta*, which was feeding on *Azalea viscosa*.

It will now be of interest to breed the four remaining species of this genus, which are of a somewhat different type, and especially *Moffatiana* and *Grœfiana*. It is a question which can only be decided by careful breeding whether these two are identical, as some Entomologists suppose. For my own part I am still inclined to think them distinct, as I have found no difficulty in separating the two species in a large series of specimens, although breeding from the egg may show them to be varietal forms.

I may add that any one intending to rear larvæ of this genus will do well to keep the imagoes frozen on ice until spring is far enough advanced to furnish tolerably mature leaves, since handling the young larvæ among small, sticky, immature leaves and buds is a most tedious operation, which is rendered still more difficult by the habit of concealment peculiar to these larvæ.

NOTES ON A FEW SPECIES OF COLEOPTERA WHICH ARE CONFUSED IN MANY COLLECTIONS, AND ON SOME INTRODUCED EUROPEAN SPECIES.

BY JOHN HAMILTON, ALLEGHENY, PA.

In exchanging Coleoptera it is common to find many erroneous determinations of species. While these errors are for the most part individual, several are wide spread and seem to be perpetuated by tradition from the older collections. The object of this paper principally is to direct attention to a few of the latter.

1. *Triplax thoracica* Say, and *T. flavicollis* Lac. These species are often found in colonies feeding together on the same fungus, and have the same appearance. The separation of mature specimens is easy, the under side of *thoracica* being entirely rufous, while the metathorax and abdomen of *flavicollis* are black or piceous.

2. *Brachyacantha indubitabilis* Crotch. Several exchange lists contained this species; but when it came to hand, in every instance it proved to be *Hyperaspis signata* Oliv., which is of a similar size and appearance. Apart from generic characters, *indubitabilis* is more convex and the elytra are not compressed at the sides. The elytral yellow spot is noticeably nearer the base, and there is a smaller one near the apex, which is wanting in *signata*. The latter is widely distributed, while Illinois is given as the *habitat* of the other.

3. *Epierus pulicarius* Er. The insect usually sent by this name is the common *Hister subrotundus* Say. A glance at the head is instantly decisive. In the former the front is convex: in the latter, broadly concave; otherwise there is great similarity.

4. *Anomala minuta* Burm. This I have never seen, nor yet a description of it. All the specimens received in exchange so named have proved to be the black form of *varians*.

5. *Dromæolus striatus* Lec. I have not yet succeeded in obtaining this from any of the lists. There was sent to me twice *cylindricollis* Say, and six times *Nematodes penetrans* Lec. The species of the genus *Nematodes* should be of easy recognition, as in all of them the last abdominal segment ends in a spine, and on the thorax there are two, or four, deeply indented impressions or punctures.

6. *Calopteron reticulatum* Fab., and *typicum* Newm. Collectors seem

to think these names represent two species. Those having *reticulatum* are always endeavoring to obtain *typicum;* while those having the latter are always seeking for the former, without either of them succeeding satisfactorily. The literature of the subject is, perhaps, answerable for the confusion. The catalogue of the species of *Calopteron* (by Crotch) is now erroneous and obsolete. Dr. Leconte, in his recent Synopsis (Trans. Am. Ent. Soc., vol. 9, p. 63), corrects certain errors that occurred in his former Synopsis (Jour. Acad. Nat. Sci., ser. 2, vol. 1, p. 74). He now makes *terminale* Say a species, and places *typicum* Newm. as a synonym of *reticulatum* Fab., referring to these two names all the forms now known east of the Rocky Mountains, regardless of the color of the thorax and elytra—to *reticulatum*, those having two elevated elytral costæ; and to *terminale*, those with four. By reference to the foot note *(ib.* p. 63) it will be seen that two unfortunate errors occur in the text at page 20, which, if not observed, would lead to great confusion.

7. *Euderces pini* Oliv. Five times this has appeared on the lists of some of the more accurate of my correspondents, and as many times, instead, have I been sent *Psenocerus supernotatus* Say. I could scarcely account for this, and for the great demand for so common and so widely distributed an insect as *P. supernotatus*, till an appeal for the correctness of the determination *pini* was made to the Journal of the Acad. Nat. Sci., ser. 2, v. 2, p. 158, the writer stating that Dr. Leconte had several years ago so named his insect. Reference to the place cited shows that Dr. Leconte then regarded the *Callidium pini* Oliv. and the *Clytus supernotatus* Say as one species, which he placed in the genus *Psenocerus*. Subsequent investigation proved that *pini* (which had been unknown in nature to Dr. Leconte) was different from *supernotatus*, both as to species and genus. The error was corrected in the books, but it has given rise to a great mistake in the tradition of the insect. I have not yet seen *pini*, but from the description of Dr. Leconte (Smithsonian Misc. Coll. 1873, vol. xi., p. 202), it certainly resembles *P. supernotatus*. To distinguish them at a glance, it is only necessary to remember that the thorax of the former, instead of being pitted, is longitudinally rugose, and that there is on the elytra anterior to the middle a smooth, ivory white, obliquely transverse line which is wanting on the latter. *E. pini* seems rare. *P. supernotatus* is one of the few Cerambycids that occasionally hybernate. In February of the present year, I found three in the folds of a Cecropia cocoon taken from some currant bushes.

8. *Dermestes Frischii* Kugel. No notice of this species as having been found in our Fauna has been observed. It occurs in great abundance on the Atlantic coast at Brigantine, N. J., on sand-hills among fish refuse from the hotels. Till recently I regarded it as a variety of *vulpinus* Lin., but the receipt of *Frischii* from Europe enabled me to correct the error. Specimens sent to Mr. C. Spiess, Switzerland, labeled *vulpinus*, were also recognized at once as *Frischii*. It belongs to the division of the genus with *vulpinus*, from which it differs in being smaller, more scaphoid in outline. and in the last abdominal segment having only the *tip and a spot on each side denuded*. The under side is densely clothed with pure snowy pubescence, except the usual row of denuded spots on each side of the abdomen, and a smaller one on the episternum of the metathorax close to the elytra. The basal half of the femora is covered with the same white pubescence, and is not annulated. The pubescence on the sides of the thorax is the same as in *vulpinus*, though the triangular black spot has sparse semi-erect grayish pubescence, like the elytra.

9. *Dermestes murinus* Linn. Mr. H. F. Jayne, in his Revision of the Dermestidæ of the U. S., Proc. Am. Phil. Soc., 20, 350, describes *murinus* Linn., placing under it as varieties *caninus* Germ., and *rattus* Lec., and making synonyms of *nubilus* Say and *dissector* Kirb. With about fifty European specimens before me, and omitting the synopsis which is not applicable to the European *murinus*, I would call the description fair, provided "cinereus" is interpreted strictly to mean *gray tinged with black;* but in that sense, it does not apply to *nubilus*, in which *fulvus* takes the place of cinereous. If considered wise to unite in one species the above named forms, it might give better results to make *nubilus* a variety also, the differences between it and *murinus* being quite as appreciable as those of *caninus* or *rattus*. *Murinus* is black—has black antennæ, the mottling is of a different pattern, and it has not on it a fulvous hair or scale, except on the scutellum. *Nubilus* is blackish brown—has rufous antennæ, and the fulvous pubescence rather predominates over the dark.

Blaps mortisaga Linn. By whose authority this has been placed on our Catalogue is unknown to me. I have three insects from West Virginia, so called; but Mr. C. V. Riley, in a late number of the *American Naturalist*, says the Virginia species is *similis* Latr. It is greatly to be regretted that introducers of species frequently neglect to characterize them, so that when found by others they may be recognized. A name without a description is only an aggravation. In the present instance I

have Trans-Atlantic specimens of both species, and the American form differs from either of them fully as much as they do from each other. The European *mortisaga* and *similis* seem to vary much within specific limits; and had my American forms occurred in localities remote from one another, species-makers would doubtless have given each a distinct name. One has the thorax smooth, sparsely pitted, and the elytra sulco-striate; another has the former uneven with shallow depressions, and also the elytra similarly sculptured and without the faintest appearance of striation or indentation; while the third is intermediate. From the material before me I would say that the Virginia insect is as likely to be *mortisaga* as *similis*, with the chances in favor of some other of the numerous European species.

The species of *Donacia* are greatly confused, and as sixteen new species have been added since the last Revision (by Crotch), fourteen of which were described in Europe, a new synopsis accompanied by good descriptions is greatly desired. The same may be said of several other genera, especially *Brachynus*, *Bembidium*, *Heterocerus* and *Lachnosterna*, for all of which it is almost useless to exchange.

GLAUCOPTERYX CUMATILIS AND MAGNOLIATA.

BY J. ALSTON MOFFAT, HAMILTON, ONT.

CUMATILIS, G. & R.

Color of front wings greenish white, with heavy black markings; in one light the whole front wing is suffused with a rich smoky brown, whilst in another it has a beautiful green gloss deepest in the centre. Hind wings brownish gray. Two specimens.

MAGNOLIATA, Guen.

Color of front wings white with black and light gray markings. Five specimens, varying considerably from one another. Hind wings white, more or less pure.

The markings in both forms are identical, but differing greatly in depth and distinctness. In *Cumatilis* there is a sinuate line across the centre of the front wing of a buff color, quite distinct. In *Magnoliata* it is so faint as to be scarcely perceptible. *Magnoliata* has a conspicuous black

spot in the centre of the front wing, which is obscured in *Cumatilis* by its heavy black markings. I have not seen the description given with either name, but in a foot note to *Cumatilis* in his Check List, Mr. Grote remarks : " Dr. Packard calls this species Guenee's *Magnoliata ;* Guenee's descr., x., 455, calls the fore wings 'white, with black lines dividing the wing in five spaces,' with a 'thick cellular spot.' The hind wings are called 'white,' and there is no 'green' mentioned.

I think it is probable I have both forms in these specimens which I captured here last summer for the first time. I have no doubt they are one species, but so distinct in their appearance as to make the use of both names desirable and convenient ; whilst from the boldness of its markings and the superior beauty of the insect, *Cumatilis* seems naturally to claim the precedence.

KIRBY'S "INSECTA."

We are glad to be able to announce that we have reprinted from the pages of the CANADIAN ENTOMOLOGIST, the "Insects of the Northern Parts of British America," compiled by the Rev. C. J. S. Bethune, M. A., formerly the Editor of the CAN. ENT., from "Kirby's Fauna Boreali-Americana : Insecta." The volume contains some 170 pages, and will be found of great assistance to Coleopterists. The price is $1.

CORRESPONDENCE.

RARE MOTHS AT MONTREAL.

Dear Sir : Last fall an important addition was made to our list of Sphingidæ. A number of larvæ of *Philampelus achemon* were discovered on cultivated grape-vines growing in the open air, at a gentleman's residence in this city. Another western Sphinx, *Deilephila lineata*, is taken here, but very rarely. I have heard of only two specimens in ten years. Last year, a specimen of *Samia columbia* was brought to me, captured in a central part of the city. A few days afterwards I received a *Hepialus thule*, Strecker, described by him in No. 12 of his "Lepidoptera," from a specimen sent him from here by Mr. Caulfield. Mr. J. G. Jack, of

Chateauguay Basin, also has a very beautiful specimen of this moth. These three are, I believe, the only specimens in collections.

Montreal, February, 1884. G. J. Bowles.

ENEMIES OF PIERIS MENAPIA.

Dear Sir : The determination of the Hemiptera collected in Washington Territory permits me to give the following notice. *Podiscus crocatus* Uhler (MS.) is a very eager enemy of the pupa and the caterpillar before pupating, when it is very sluggish. The *P. crocatus* was everywhere common in the devastated forests, and observed in the act of sucking caterpillars. *Neides muticus* Say was seen near Loone Lake on the freshly laid eggs ; one specimen, together with the eggs, is before me.

Cambridge, Mass., Feb. 27, 1884. H. A. Hagen.

BOOK NOTICES.

The Geological and Natural History Survey of Canada.—The last volume issued by the Department is full of interest, and betokens much care and skill in its preparation. The maps are excellent. A new feature is a separate Catalogue of Canadian Plants, by Prof. John Macoun, the well-known Naturalist of the Survey. Part I.—Polypetalæ—is the first of this proposed publication, and it will be a source of great gratification to all our Naturalists to know that a commencement has been made in this desirable undertaking. We learn from Dr. Selwyn, the Director of the Survey, that "it is intended to enumerate systematically the plants of the Dominion of Canada, and to define their range in so far as the knowledge at present available enables this to be done. This, the first part of the Catalogue, will be followed by others as it is possible to complete the necessary examination of collections and authorities. We venture to express the hope that in due time the "Fauna" of the Dominion may be catalogued in a similar manner, and that the Natural History Survey will be carried on with energy and skill in all its branches.

The Canadian Record of Natural History and Geology.—This magazine is published by the Natural History Society of Montreal, and takes the place of the *Canadian Naturalist*, formerly published by the Society. The *Record* will be published quarterly.—E. B. R.

(December, '83, No., mailed February 20, '84.)
(January, '84, No., mailed March 4, '84.)

The Canadian Entomologist.

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TWO NEW MYRMECOPHILÆ FROM THE UNITED STATES.

BY LAWRENCE BRUNER, WEST POINT, NEBRASKA.

Before describing these interesting little crickets which have been neglected or overlooked so long in this country, it becomes necessary to enter somewhat into details. The group being one not often written upon, or the specimens often met with, they are therefore rare to collections. Prior to this account but two authentic notices of their capture in the United States have appeared, viz., the one referring to a specimen taken in Georgia by H. K. Morrison, and the other a reference to the present described species, one from the vicinity of Washington, D. C., and the other from the Pacific coast, at Portland, Oregon, the former of which is herewith figured (fig. 4), *a* representing the female, and *b* the male. This is undoubtedly the largest *Myrmecophila* known, being fully 4 m. m. in length, while the largest European species measures nearly one fourth less.

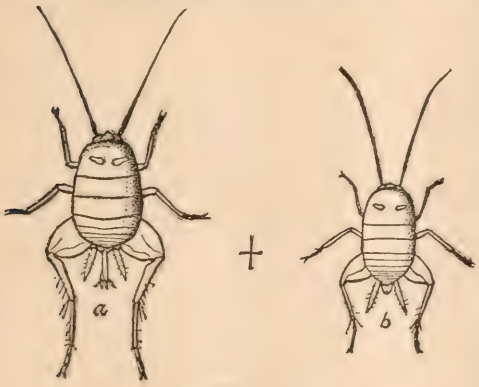

Fig. 4.

The habits of our two species, as far as known, agree well with those of the Orient. They are to be met with in the nests of various species of ants, and especially such as live in rotten stumps and logs or under stones in damp localities. Among these may be mentioned *Camponotus pennsylvanicus*, *Formica rufa*, and *Cremastogater lineolata*.

This being the first description of insects in this country belonging to the genus *Myrmecophila*, it would not be out of place here to give a short diagnosis of the genus before proceeding to the species.

Generic Characters of *Myrmecophila* :—

Body ovate, greatly convex, apterous. Occiput entirely hidden by the pronotum, vertex depressed. Eyes ocelliform. Furrows of the antennæ greatly impressed. Antennæ as long as the body, thickest at base, apex pointed. Pronotum large, wide, narrow in front, wide behind with the front and hind margins usually straight, lobes deflexed but not contracted. Meso- and meta-notum not differing from the segments of the abdomen except in some instances where they are wider. Anterior feet small, subcompressed. Anterior tibiæ without tympanæ, unarmed. Posterior femoræ greatly enlarged, dilate ovoid. Posterior tibiæ shorter than femoræ, stout, compressed, with the upper margin ciliate, internal margin with four movable spines, external margin with two spines, and with four long, terminal spurs. Abdomen short, greatly depressed, and attenuate or tapering. Cerci strong, as long as or longer than the abdomen. Ovipositor short and quite stout. The male differs from the female in its more slender form and its smaller size.

Myrmecophila Pergandei, n. sp.

General form looking from above oval, smallest at the head. The latter depressed, deeply sunken into the front margin of the pronotum. Basal joint of the antennæ very large and globular, with a few short bristle-like hairs encircling the insertion of the second joint, remaining joints gradually decreasing in size toward the apex. Antennæ as long as body, pale yellowish at base, remaining portion rufous. Eyes small, black, composed of a group of ocelli-like cells, which are situated immediately behind the base of the antennæ—in dried specimens partly concealed by the front margin of pronotum. Anterior legs small, slightly compressed, unarmed. Posterior femora greatly enlarged, compressed, ovate incrassate ; tibiæ stout, also slightly compressed, shorter than femora, and furnished with four movable spines on the inner and two on the outer edge ; apex with four long spurs. Tarsi plain. Cerci stout, acuminate, slightly thickest in middle, as long as the abdomen, quite hairy ; a trifle heaviest in the male. Ovipositor slender and larger than usual, with the valves of equal lengths, as shown in the accompanying illustration (Fig. 4, *a*).

Pronotum large, wide and greatly deflexed ; narrow in front and wide behind ; front and hind edges straight. Meso- and meta-notum equal, much larger than first abdominal segment. Color, ochraceous and piceous. Front margin of pronotum and hind margins of thoracic and

abdominal segments, with apex of ovipositor, piceous brown. The characteristic feature of the species is, however, the two light colored elliptical markings upon the disc of the pronotum, as shown in the figure.

♀ 4 m. m. and ♂ 3.85 m. m. in length.

Habitat. Atlantic States, from Maryland southward.

Myrmecophila Oregonensis, n. sp.

Elongate oval, body somewhat contracted at its junction with the pronotum, which latter is slightly narrowed at its posterior edge, making its sides appear bulging. It is a more slender species than the preceding, the female of this insect being very similar to the male of that species. Pronotum small, with the sides rounded, posterior edge very slightly arcuate; meso-, meta-notum and first abdominal segments equal. Cerci or anal stylets comparatively slender, 1.2 m. m. in length. Ovipositor 1.5 m. m. in length, medium stout, with the external sheaths slightly longest and pointed, with the points directed outward; internal ones acuminate. Color piceous brown above, with the under side and base of segments lighter. Antennæ concolorous. Disc of pronotum also light colored, but without the two elliptical spots, which are present in *M. Pergandei.*

Female 3.90 m. m. in length, male unknown.

One mature female and a pupa of this last species were collected at Portland, Oregon, in the summer of 1882, by Mr. Samuel Henshaw, of Boston, Mass. The types are deposited in the Museum of Comp. Anat., Cambridge, Mass.

OBITUARY NOTICE.

Mr. Anson Allen died at his home in Orono, Feb. 8, 1884, in the 55th year of his age. He was, without doubt, one of the best collectors, and one of the most careful, accurate and acute observers of insects, their habits and transformations, that we had among us. For a number of years past he spent nearly all the time he could spare from his business in collecting, breeding and exchanging Lepidoptera, and many collections, both in this country and Europe, have been enriched by additions from his exquisite preparations.

Mr. Allen would never save an insect unless it was absolutely perfect, except such as were very rare. For several years he bred from the eggs,

columbia, cecropia and many others in large numbers, and although he could not be prevailed on to publish his observations on the early stages of these moths, the conclusion he reached, that *columbia* is a good and distinct species, is worthy of careful consideration.

He corresponded with very many of our prominent Entomologists, and made extensive exchanges; and many, when they read these lines, will be pained to learn that he is with us no more.

Mr. Allen was one of the most unassuming of men, and was appreciated at his best only by those who knew him intimately. He did not confine himself to insects, but made a fine local collection in other departments of natural history.

C. H. Fernald.

ADDITIONS TO CANADIAN LISTS OF COLEOPTERA.

BY W. HAGUE HARRINGTON, OTTAWA.

In a list which is now being published by the Ottawa Field Naturalists' Club, of Coleoptera collected in the vicinity of Ottawa, I have indicated a considerable number of species which appear not to have been hitherto included in our Canadian lists. As a record of these species may be of some interest to readers of the Entomologist who may not see the above mentioned publication, I send you a list in which I have also incorporated a few species (distinguished by an *) which, while already recorded, are of unusual rarity or interest. About twenty per cent. of my species are yet unnamed, and a vast amount of work remains yet to be done before the Coleoptera of this district can be considered as satisfactorily known.

CARABIDÆ.

**Blethisa quadricollis* Hald. Two specimens taken under driftwood on shady shore of the Ottawa, in June.

Clivina americana Dej. Common, and the only species found.

Dyschirius hispidus Lec. Taken in swampy meadow.

Pterostichus diligendus Chd. Rare, under driftwood.

Amara exarata Dej. Two or three specimens only.

polita Lec. Rare, under stones.

Platynus propinquus, Gemm. Rare, in damp pastures.

Cymindis borealis Lec. In dry pastures, in July.

Brachynus americanus Lec. Common under stones along the river, with *perplexus* Dej. and *medius* Harris.

Having had but little opportunity for the collection of water-beetles, my species are not numerous, and I can say little as to their relative rarity or abundance. As soon as the ice melts I will endeavor to gain a fuller knowledge of our Hydroporini and allied tribes.

DYTISCIDÆ.

Hydroporus hybridus Aubé. Not rare in the Ottawa in May and Oct.
dichrous Mels. One specimen.
americanus Aubé. One specimen.
notabilis Sharp. One specimen.

HYDROPHILIDÆ.

Helophorus obscurus Lec. (var.) One specimen.
Hydrochus rufipes Mels. Common.
Hydrobius feminalis Lec. One specimen.
Cercyon pygmæum Ill. Rare.

SILPHIDÆ.

Hydnobius substriatus Lec. One specimen in October. Dr. Leconte informed me that this beetle was exceedingly rare.
Liodes geminata Horn. In fungus.

SCYDMÆNIDÆ.

A large number of beetles belonging to this, and to the following three or four families, as well as species from many other families, were secured from moss and swamp grass collected in several localities immediately before the setting in of winter. Although I have only four species belonging to the Scydmænidæ, one of these is considered by Mr. John B. Smith to be perhaps a new species.

Scydmænus n. sp.? Of same size as *fatuus* Lec., but easily separated from that species by its pale antennae and legs.

PSELAPHIDÆ.

Bryaxis Brendelii Horn. Rare.
puncticollis Lec. One specimen.
tomentosa Lec. Very rare.

STAPHYLINIDÆ.

Many of my species in this troublesome family are still undetermined, but there are a few to record, including some which are MSS. species of Fauvel (determined for me by Mr. John B. Smith).

Aleochara gracilicornis Fauvel MSS.

Oxypoda tenebrosa Fauvel.

Gyrophæna corruscula Er.

**Staphylinus cæsareus* Cederh. In "New Species of North American Coleoptera," Part I., Dr. Leconte described as *S. ornaticauda* a specimen of this beetle from Canada (collection of Mr. Uhler), locality not stated. Whether the species, which is a European one, has been since taken in Canada, I do not know, but it has been found at Detroit. The single specimen taken by me was captured on 2nd June last, under a log in very moist ground, at Billings Bridge, two miles from the city.

Philonthus niger Mels.

lætulus Say. Rare. Perhaps confused by our collectors with *blandus*. Occurs in Lower Peninsula of Michigan.

agilis (?)

quadricollis Fauvel MSS.

Dianous cærulescens Gyll. One specimen. This is also a European species, but is recorded from Lake Superior (as *D. chalybeus* Lec.)

Lathrobium rubripenne Fauvel.

Bryoporus cribratus Fauvel.

Mycetoporus lepidus Grav.

Trogophlœus nitellus Fauvel.

Geodromicus nigrita Mull. Occurs in Lower Peninsula of Michigan (= *Anthophagus verticalis* Say).

TRICHOPTERYGIDÆ.

Ptenidium evanescens Msh. One specimen from moss.

Nephanes læviusculus Matth. This minute species is apparently not rare in moss, and may be taken as so well described by Prof. Bell in ENTOMOLOGIST last year.

COCCINELLIDÆ.

Hyperaspis bigeminata Rand. Rare. This beetle is recorded from Lake Superior, Michigan and Buffalo among other places, and being so widely distributed, it seems strange that it is not in our lists.

Scymnus fraternus Lec.?

CUCUJIDÆ.

Læmophlœus convexulus Lec. Rare.

DERMESTIDÆ.

Dermestes bicolor Fabr. One specimen.
Cryptorhopalum ruficorne Lec. Rare.
Orphilus glabratus Er., var, Rare.

HISTERIDÆ.

Hister defectus Lec.
exaratus Lec.

BYRRHIDÆ.

Syncalypta echinata Lec. Very abundant a few years ago on the Parliament Buildings, but rarer of late.

DASCYLLIDÆ.

Scirtes orbiculatus Fabr. Several specimens of this pretty species were taken last summer, on weeds growing along a stream flowing through an old beaver meadow, but owing to the variety of plants growing intermingled, I cannot say on what species it occurred. Previously to last year only one specimen had been taken by me.

Cyphon collaris Guér. This species is rare, not more than half a dozen specimens having been captured.

(To be Continued.)

CERATOCAMPA (CITHERONIA) REGALIS, Fab.

BY JOHN HAMILTON, ALLEGHENY, PA.

In the first number of this volume one of your contributors, Mr. Clarkson, writing about *Citheronia regalis*, infers that the moth always appears about the end of May, regardless of the time at which the larva enters the earth, and that it is the habit of the pupa to work out of the earth and lay on the surface of the ground during the winter. The first statement is correct in a certain sense. The insect in question is not uncommon here, and I have had them in numbers. Take a larva captured the first week in August and another the last in September, and allow them

to pupate in the same box and to remain together—they will disclose within a day or two of each other; but whether at the last of May or at some other time, depends on the temperature at which they have been kept. Keep the pupa of the one taken in August at a temperature a few degrees lower than that of the September one, and it will disclose much later, perhaps about the time the offspring of the other are entering the earth. I had one pupa that did not disclose till June of the second year. The time of development seems to largely depend on the temperature that surrounds the pupa—a fact that is well known.

The coming of a pupa to the surface is the exception, and not the rule. Those of several other earth-inhabiting species do the same when the ground selected or forced on the larvæ is unsuitable. This occurs in nature as well as in confinement. Take two parts of sandy loam, such as is used by plasterers, and one part of black, friable soil from the woods; mix together, put, to the depth of eight inches, in a good sized tin or iron box, and when the larvæ disappear cover over with a layer of moss, and then no pupæ will come to the surface.

As soon as the pupa is fully formed it commences a series of gyrations that result in the formation of an earthy cell, roomy, much larger than itself and impervious to ordinary moisture. This prevents it from being crushed by the expansion of the surrounding earth by freezing, and also from shriveling up by the absorption of its moisture in time of drouth; or from drowning from excessive wet. In hard ground the larva cannot penetrate deeply, nor make a wide excavation, and in endeavoring to enlarge its narrow surroundings it wriggles itself to the surface, where it stands small chance to survive to the time of disclosure.

ENTOMOLOGICAL NOTES.

BY PH. FISCHER, BUFFALO, N. Y.

I have often read articles about keeping parasites out of cabinets, and have seen in many entomological papers different remedies suggested to keep them from destroying, in a very short time, even the largest collection. I will now add my own experience, and remedy which always proved to be efficient during my 14 years' collecting, in which time I have not even lost one specimen. It will especially prove of interest to the

beginner. In the first place I would advise all those who cannot afford a large cabinet with good fitting drawers, to go to any good joiner and have some boxes made after the following pattern: Take the lumber about three-sixteenth inch thick for top and bottom, for the sides quarter of an inch. Have the box about 15 inches long by 12 inches wide, and 4 inches thick outside measure, and shape it book form, the bottom and top a quarter of an inch projecting. That portion which represents the cover of the book is cut into lengthwise, so as to make two receptacles, each about two inches high. The back is made of three-quarter inch lumber, in the shape of the back of a real book, which is covered with some strong cloth or thin leather outside, and cloth inside, to act as hinges. The two parts will have to be constructed so that they will, by closing them, fold together about a quarter of an inch. Have this neatly covered and lined with a suitable soft material, and it will be a tight and handy box for any kind of insects. Before transferring insects in a new box, I put them on cork and expose them to a moderately hot oven, which I also invariably do with insects received through exchanges. After a certain time, say half an hour, I take them out, and they are placed in the box, in which is pinned a little sponge the size of a small nut, saturated with carbolic acid (crystallized), which has to be renewed every 6 or 8 weeks. Old cabinets infested with parasites, when once introduced, can be cleared by the same method, only that the drawer or box, before pinning back the specimens, also has to be exposed to the heat of the oven.

I promised you my further success in hatching Lepidoptera with artificial heat. Pupæ of *Hyperchiria io* taken to a warm room, 64–80 degrees, on Feb. 10, 1884, came out as follows:—

Feb. 24, one ♂ and one ♀.
" 26, one ♂.
Feb. 27, one ♀.
" 28, one ♂.
Mch. 1, one ♂.
" 3, one ♀.

Of the lot taken to the room on December 5, a ♀ of *T. polyphemus* hatched on Feb. 16, depositing 142 eggs within three days, commencing laying the first night; eggs, of course, were sterile.

BRIEF NOTES OF A TRIP TO POINT PELEE, WITH ADDITIONS TO OUR LIST OF CANADIAN BUTTERFLIES.

BY THE EDITOR.

During the summer of 1882, we paid a flying visit to Point Pelee, in company with some friends who were interested in Botany. This point of land extends directly south into Lake Erie, near the eastern boundary of the County of Essex, and is among the most southerly points in the Province of Ontario. On the west side of the Point the land is chiefly marsh until near the extremity, and is a prolific hunting ground for sportsmen in search of water-fowl; it is also a breeding place for millions of Neuropterous insects. The east shore is sandy, and between this and the marsh are several farms and a considerable area of uncultivated arable land more or less covered with woods.

We reached Essex Centre, on the Canada Southern Railway, the nearest point of access by rail, at 7 p. m., on the 28th of June, where we hired a vehicle and driver for three or four days, and drove that evening over an excellent road 18 miles to Leamington. The night was spent here and an early start made the next morning for the Point. A drive of about three miles brought us to the base of the Point, and after a journey of about eight miles farther, we reached the upper extremity.

The day was warm and pleasant, and during the last portion of this drive we saw more Dragon-flies and other Neuropterous insects than we had ever seen in our lives before; they literally swarmed everywhere, especially in sunny spots. They flew in our faces and buzzed about our ears as we were driving, and settled on our clothing in considerable numbers. After catching all that could be conveniently carried, we amused ourselves by swinging the net in different directions, catching a few dozen and then letting them fly again. Among the most numerous species were *Libellula basalis*, *L. trimaculata*, *L. exusta*, *Diplax intacta*, and *D. rubicundula*, with some others undetermined. During the drive there also floated past us on rapid wing several specimens of *Papilio cresphontes* and one or two *P. marcellus*, but they flew with the prevailing wind directly over the swamp, where pursuit was impracticable. As we passed a sunny spot in the woods, approaching the end of our journey, a small dark-colored insect was seen hovering about some flowers growing

by the road-side, which from its peculiar jerky flight, was evidently a *Thecla*. A brief chase resulted in its capture, when it proved to be *Thecla smilacis* Boisd., = *auburniana* Harris, never before, to our knowledge, recorded as occurring in Canada. As we approached the extremity of the Point, we left the swamps behind us and with them the multitudinous hosts of the larger Neuropterous insects, but several of the smaller species were present, associated with Dipterous insects, in prodigious numbers, flying in clouds from every tree and bush we touched, the vibration of their many wings causing a loud roar or buzz. The sides of houses and barns were so thickly covered with them as to almost hide the wood they rested on, but they did not venture inside the buildings.

The next day was unfavorable for collecting; the rain poured in torrents until early in the afternoon. As soon as it had ceased, we wandered several miles along the sandy roads and shores, and found many interesting plants and trees, but there were very few insects on the wing, excepting those belonging to the Neuroptera, which were everywhere in abundance. Late in the afternoon, while beating about among the bushes on the sand hills on the eastern shore, a yellow butterfly started up which at first was thought to be a pale *C. philodice*, but there was something unusual about its appearance and manner of flight which led us to pursue it until captured. Imagine our surprise when we found it to be a female specimen of *Terias Mexicana* Boisd.

In W. H. Edwards' Catalogue of Diurnal Lepidoptera, *Thecla smilacis* Boisd. is said to be found in the Atlantic States, Mississippi Valley and Texas, while the localities given for *Terias Mexicana* are Texas to Arizona; California, occasionally in Kansas and Nebraska.

Since both these butterflies are new to our Canadian lists, we append descriptions of them.

Thecla smilacis is thus described by Boisduval: "Upper side blackish brown, with a pale whitish spot near the middle of the costal edge; the secondaries have two thin tails as in the analagous species.

"Under side greenish, often washed with a little reddish, with a transverse whitish ray sinuous on the primaries, tortuous on the secondaries, bordered in front by a ferruginous tint. Between this ray and the base, the secondaries have another short transverse sinuous ray of the same color. The extremity is marked by two or three ashy crescents, of which the intermediary is black in front, and the third in a line with two or three

small ferruginous spots, more or less distinct. The anal palette is black, and near the fringe there is a small white marginal line.

"Larva, which feeds on *Smilax*, is green, with the head and feet blackish. It has four rows of red spots, of which the two dorsal are formed of smaller spots, and one on each side composed of spots somewhat larger.

"Chrysalis grayish-brown, with the abdomen more clear and reddish."

Harris, who regarded this species as distinct from *smilacis*, thus describes it under the name of *auburniana*, and Harris' description agrees more closely with the specimens captured by us than does that of Boisduval. Harris says: "The outermost of the tails of this insect is very short, and often nothing remains of it but a little tooth on the edge of the wing. It varies considerably in color; the females are generally deep brown above, but sometimes the wings are rust-colored or tawny in the middle, as they always are in the males; the oval opaque spot which characterizes the latter sex is ochre-yellow. Upon the under side the wings in both sexes are green, the anterior pair tinged with brown from the middle to the inner edge; externally next to the fringe they are all margined by a narrow wavy white line, bordered internally with brown; this line on the fore wings does not reach the inner margin; on the hind wings it consists of six spots arranged in a zigzag manner, and the last spot next to the inner margin is remote from the rest; besides these there are on the same wings three more white spots bordered with brown between the zigzag band and the base; and between the same band and the margin three black spots, behind the middle one of which is a rust-red spot with a black centre. The wings expand from 1 2/10 to 1 1/10 inch. This pretty species is found on the mouse-ear *(Gnaphalium plantagineum)* in May, and on the flowers of the spearmint in August."

"*Terias Mexicana* Boisd. Boisd. Spec. Gén. 679. Figured on pl. 3, C. fig. 1, of Boisd. Spec. Gén.

"Wings brilliant citron yellow; primaries with a black border at the extremity, rather wide, ending squarely at the internal angle, showing near the middle a rather deep quadrangular sinus; the outer edge slightly sinuate, and whitish; secondaries, with the middle of the exterior edge prolonged to a prominent angle, in the form of a tail; a black border of moderate width, a little dentated on its internal side, not reaching the

internal angle; costal edge washed with orange yellow, mingling with the ground color.

"Under side of the primaries pale citron yellow, with a black central point, the edge intersected with brown points; the outer edge reddish near the fringe.

"Under side of secondaries yellow, sprinkled with ferruginous atoms, with a blackish central point; edge intersected with ferruginous points, and marked near the external angle with a spot of the same color; the posterior half having four or five other spots of the same color, of which two or three are in a line, and tending to form a transverse band; the middle of the outer edge more or less washed with ferruginous.

"Female differs from the male in the upper side being yellowish white, with a wider border, the quadrangular sinus more profound; the anterior edge of the secondaries widely orange yellow, and below, three ferruginous posterior spots form on the secondaries a narrow, transverse, ferruginous band.

"Texas—Louisiana—Mexico."

Among the other insects taken were *Papilio cresphontes*, *P. turnus*, *P. troilus*, *Colias philodice*, *Terias lisa*, *Argynnis cybele*, *Phyciodes tharos*, *Pyrameis huntera*, *P. atalanta*, *Anchyloxypha numitor*, *Pholisora catullus*, *Eudamus tityrus*, *Eudryas grata*, *Leucania unipuncta*, *Lucanus lentus* and *Macrodactylus subspinosus*. The latter species was very common on the flowers of the tulip tree *(Liriodendron tulipifera)*, which was then blooming freely; also on the sour gum or Pepperidge tree *(Nyssa multiflora)*.

The next morning we started early on our return journey and reached Essex Centre in time to take the afternoon train home. Had the weather been favorable we should doubtless have reaped a much richer harvest.

THE HAIRY LARVÆ AND THEIR PARASITES.

BY FREDERICK CLARKSON, NEW YORK CITY.

It is generally acknowledged by Entomologists that the hairy larvæ, such as the Arctians and their allies, very commonly escape parasitic attack, a circumstance attributable to the fact, that in order to permit the deposit of ova, these caterpillars must be discovered by the parasites in favorable postures, or else worried by them into such, that the spines separating, give the only opportunity for the insertion of the ovipositor.

This was clearly demonstrated in an attack made by an Ichneumon upon a larva of *Apatela Americana* Harris, which came under my observation in the early part of last autumn. This genus belongs to the family of the Noctuidæ, the larvæ of which, like the Arctians, are clothed with dense spinular hairs. The caterpillar had secured itself by its abdominal legs to the midrib of a maple leaf, having the fore part of its body elevated, similar to the attitude common to the larvæ of the Sphingidæ. The parasite displayed great energy in the effort to deposit, seemingly as if to compel the caterpillar to change its position, but as the caterpillar remained immovable for many minutes, probably a quarter of an hour, I was led to the conclusion that it realized its security in the position it had taken. After driving the parasite away, I discovered that the caterpillar, though perfectly life-like in form, was dead, and as hard as if petrified, and that the parasite, guided, as it would appear in this case, solely by sight, had been, like the Entomologist, thoroughly deceived. In view of the commonly accepted opinion, that insects are attracted by odor, not only to their own food, but to the proper food for their progeny, whether it be animal or vegetable, I have referred to this incident, as contributing to the theory that the parasite, in providing food for its progeny, seeks it by sight; for it would seem most improbable that a dead and dried caterpillar should retain a sufficiency of its natural odor to attract. The incident also illustrates, by the mode of attack and the prolonged effort at oviposition, that the caterpillar must be brought into an attitude favorable for the reception of the egg. I am inclined to the opinion that the reduction of these moths through the instrumentality of parasites, is largely effected while in the pupa condition, having noted this peculiarity of habit during our recent extraordinary visitation of the *O. leucostigma* Smith. The full grown larvæ of this species, collected by me, developed into moths, while from cocoons gathered it was not uncommon to obtain parasites. The cocoons of the hairy larvæ commonly consist of loose interwoven hairs, and are not so dense but that the pupa is readily discoverable by the parasite, even if the cocoons themselves do not attract them.

LARVA OF DOLBA HYLÆUS?

BY W. HAGUE HARRINGTON, OTTAWA.

On the 29th July last, while beating along the margin of a small stream, I found on my net a larva which had apparently fallen from an alder-

bush and which was unknown to me. I took it home, but it refused to feed upon alder, and I was unable to identify it and find out upon what to feed it. The only descriptions I had at hand were those of Mr. Reed in Annual Report for 1881, and no one of these seemed to answer. Finding that it refused every plant which I offered to it, and yet did not seem prepared to pupate, I put it in spirits, which, however, so discolored and shrivelled it that I threw it away. While it was alive I made the following brief note of its appearance: Light green, whitish on back, covered all over with white dots edged with black, but these most conspicuous on thoracic segments and substigmatal surfaces. Head granulated, margined by yellow and black line. Legs pink, stigmata orange fawn-color. Seven oblique white lines edged with rose and black, the last line prolonged to the caudal horn, which is long and slightly curved, with black sides and rough. It was my intention when jotting down this memorandum (to assist me in identifying the larva) to make a more full and minute description, which unfortunately I neglected to do. Recently in reading in *Psyche* the descriptions of larvæ of Sphingidæ, I came across one (Vol. II., page 77) which immediately recalled to me the larva I had taken in the summer. It is the description of a larva considered to be probably that of *Dolba hylæus*, and of which the food is sweet fern. The principal points in the description of the mature larva are as follows: Head scabrous; sphingial bands yellow or white edged with crimson, and this crimson often followed above by a narrow margin of black; horn black on the sides, with slight lateral yellow stripe, green above and beneath; the whole body profusely sprinkled with circular white dots having a black areola; spiracles testaceous, afterwards bright reddish, prolegs light brown. On turning to Mr. Reed's paper I find for this species: "Head green, with a pale blue line on each side; body pea-green with lateral oblique pink bands edged below with white; caudal horn crimson." (Abbot and Smith.) My object in sending this note is to find out whether it is now definitely known that the larva answering to these descriptions is that of the species to which it is referred. The moth has not been taken here yet so far as I know. I found last summer several other species in early stages, but did not attempt to rear them. Among them was one less than an inch long taken on button bush; thoracic segments lessening to head, which was small; general color pale green; covered all over with minute prickles or granules; horn very long and prickly.

TO OUR MEMBERS.

Ottawa, April 7, 1884.

Gentlemen : Having been honored by the Council of the Entomological Society of Ontario by being nominated as the delegate to represent that Society at the approaching meeting of the Royal Society of Canada, I shall feel obliged if any members who are desirous of availing themselves of the privilege extended by the Royal Society of having papers read before that learned body, will correspond with me without delay, so that I may make the necessary arrangements.

I would also draw attention to the last clause of No. 11 of the Regulations of the Royal Society, by which it is intimated that the Royal Society will receive suggestions from associated Societies on any matters in which the Royal Society may be of assistance in carrying out the objects of the Society. It was under this clause that your delegate last year brought before that Society the advisability of having a more liberal interpretation of the postal laws regulating the transmission of natural history specimens between students in Canada and those in the United States and Europe, and also suggested that the Government should be petitioned to allow scientific bodies to import free of duty all illustrations, etc., needed for their publications. I am, gentlemen,

Yours very truly,

J. Fletcher, V. P. Ent. Soc., Ont.

LIST OF DIURNAL LEPIDOPTERA COLLECTED IN THE NORTH-WEST TERRITORY AND THE ROCKY MOUNTAINS, DURING SEASON OF 1883, WITH LOCALITIES.

BY CAPT. GAMBLE GEDDES, A. D. C. TO LIEUT.-GOVERNOR OF ONTARIO.

(Continued from Vol. xv., Page 223.)

93. Argynnis Leto ♀, Behr. Fort Macleod.
94. " Bellona, F. Fort Ellis.
95. Lycæna Fulla, Edw.
96. " Melissa, Edw. Oxley Ranche.
97. " Neglecta, Edw. Fort Ellis.

98. Lycæna Lygdamas, Doubld. Fort Ellis.
99. " Icaroides, Bd. Red Deer River.
100. Pamphila Nevada, Edw. (?) Fort Macleod.
101. " Colorado, Scud. Medicine Hat.
102. " Idaho, Edw. Moose Jaw.
103. Phyciodes Camillus, Edw. Edmonton.
104. " Marcia, Edw. Edmonton.
105. " Nycteis, Doubld. Edmonton.
106. Argynnis Nevadensis, Edw. Calgarry.

LIST OF ZYGÆNIDÆ AND BOMBYCIDÆ TAKEN AT ORONO, MAINE, AND VICINITY.

BY MRS. C. H. FERNALD.

ZYGÆNIDÆ.

Alypia octomaculata, Fabr. Rare.
" Langtonii, Coup. 1 ex.
Eudryas unio, Hübn.
Scepsis fulvicollis, Hübn.
Ctenucha virginica, Charp.
Lycomorpha pholus, Drury.

BOMBYCIDÆ.

Nola minuscula, Zell. Rare.
Argyrophyes nigrofasciata, Zell. Rare.
Clemensia albata, Pack.
Crambidia pallida, Pack.
Hypoprepia fucosa, Hübn.
Llthosia bicolor, Gr. 1 ex.
Euphanessa mendica, Walk.
Crocota rubicundaria, Hübn.
" quinaria, Gr. Rare.
" opella, Gr.
Utetheisa bella, Linn. Rare.
Callimorpha Lecontei, Boisd. Rare.
Platarctia borealis, Moeschl. 1 ex.
Arctia virgo, Linn.
" Saundersii, Gr.
" figurata, Drury. Rare.
" virguncula, Kirby.
Pyrrharctia isabella, A. & S.
Phragmatobia rubricosa, Harr.
Leucarctia acraea, Drury.
Spilosoma virginica, Fabr.
Hyphantria cunea, Drury. Spotted form, rare; pure white form, common.
Euchaetes egle, Drury.
" Oregonensis, Stretch. Very rare.
Halisidota tessellata, A. & S.
" caryæ, Harris.
" maculata, Harris.
Orgyia nova, Fitch.
" leucostigma, A. & S.
Parorgyia Clintonii, G. & R. Rare.

Parorgyia parallela, G. & R. Very rare.
Dasychira Lintneri, Gr. 1 ex.
Euclea querceti, H.-S.
Limacodes biguttata, Pack. 1 ex.
" fasciola, H.-S. Rare.
Packardia ocellata, Gr. 1 ex.
Tortricidia testacea, Pack. Rare.
Ichthyura inclusa, Hübn. Rare.
" albosigma, Fitch.
" vau, Fitch.
Datana ministra, Drury.
" integerrima, G. & R.
Nadata gibbosa, A. & S. Rare.
Gluphisia trilineata, Pack.
Notodonta stragula, Gr. Rare.
Lophodonta ferruginea, Pack.
" angulosa, A. & S. Rare.
Pheosia rimosa, Pack. Very rare.
Nerice bidentata, Walk.
Edema albifrons, A. & S.
Seirodonta bilineata, Pack.
Oedemasia badia, Pack. Rare.
Dasylophia interna, Pack. 1 ex.
Cœlodasys unicornis, A. & S.
Ianassa lignicolor, Walk. Rare.
Heterocampa marthesia, Cram.
Heterocampa cinerea, Pack.
" subalbicans, Gr.
Cerura occidentalis, Lintn. Rare.
Platypteryx arcuata, Walk.
Prionia bilineata, Pack. Rare.
Dryopteris rosea, Walk, Rare.
" irrorata, Pack. Very rare.
Actias luna, Linn.
Telea polyphemus, Cram.
Platysamia cecropia, Linn.
" columbia, Smith. Rare.
Hyperchiria io, Fabr.
Dryocampa rubicunda, Fabr. Rare.
Clisiocampa americana, Harr.
" disstria, Hübn.
Gastropacha americana, Harr. 2 ex.
Tolype velleda, Stoll. Rare.
Prionoxystus robiniæ, Peck. Very rare.
Hepialus argenteomaculatus, Harr. Rare.
Hepialus quadriguttatus, G. Very rare.
Hepialus mustelinus, Pack. Very rare.
Hepialus gracilis, Gr. Rare.

BOOK NOTICES.

Proceedings and Transactions of the Royal Socieiy of Canada.

The first volume of the Transactions of the above Society, covering the work done during the years 1882 and 1883, has been received. It is a handsome quarto volume of 720 pages, illustrated by 13 plates. The first 71 pages is devoted to an account of the Proceedings of the Society for the years 1882 and 1883; the remainder is divided into four sections —1st, French Literature, History, etc., occupying 165 pages; 2nd, Eng-

lish Literature, History, etc., 96 pages; 3rd, Mathematical, Physical and Chemical Sciences, 98 pages; 4th, Geological and Biological Sciences, 286 pages. The matter is well printed and on excellent paper, and the whole work—notwithstanding that the lists of *errata* are rather longer than they should be—is a credit to the country and an evidence of solid progress in scientific research in Canada.

Ottawa Field Naturalists' Club, Transactions, No. 4, 1882–1883; 8vo., pp. 89, with one plate.

This number, although somewhat late in being issued, is highly creditable to the Club, and shows that its members are still actively engaged in working up the natural history of their locality. Following the Report of the Council is the excellent and instructive address of the President, Mr. James Fletcher, who is also Vice-President of the Ent. Soc. of Ontario. Next in order are valuable papers on the Laurentian System, the Fishes of the Ottawa District, the Ducks of the locality, etc. There are also reports from the general branches of Geology and Mineralogy, Paleontology, Botany, Conchology, Ornithology, and Entomology, the last occupying six pages with the record of its excellent work. We heartily congratulate our fellow laborers in natural science belonging to this Club for the excellent example they have set their sister cities in Ontario by their thoroughness and enthusiasm.

The Butterflies of Maine; by Prof. C. H. Fernald. 8vo., pp. 104, illustrated with 28 figures.

Our thanks are due Prof. Fernald for a copy of this work, designed more especially for the use of students in the Maine State College, but one which will be found very useful to all who take an interest in our northern butterflies. In the introduction, which occupies 18 pages, brief reference is made to the classification, transformations, external and internal anatomy of insects, followed by an accentuated list of the names of butterflies and an artificial key designed to aid in determining the 59 species which are recorded as found in Maine. The descriptions are written in a plain and practical style, as free from technicalities as the subject will admit of.

Papilio: A Monthly Journal Devoted Solely to Lepidoptera.

This excellent publication, which has been so ably conducted for the past three years by Mr. Henry Edwards, of New York, has passed into the hands of Mr. Eugene M. Aaron, Curator of the American Entomological Society, Philadelphia, who will continue to publish it as heretofore.

The enthusiasm and ability Mr. Aaron brings to the task will, we have no doubt, enable him to fully maintain the good name this journal has already acquired. We sincerely hope that entomologists generally will aid this useful work by subscribing for it, and we trust that under Mr. Aaron's able management the career of *Papilio* may be an eminently successful one. Mr. Aaron's address is Lock-box 2,500, Philadelphia, Pa.

The Canadian Sportsman and Naturalist.

We regret to learn of the demise of this useful journal. Three volumes have been published, containing much valuable information concerning the natural history of Canada.

CORRESPONDENCE.

The Entomological Society of Washington has organized with the following officers: President, Dr. C. V. Riley; first Vice-President, Dr. J. G. Morris; second Vice-President, Geo. Marx; Recording Secretary, E. A. Schwarz; Corresponding Secretary, L. O. Howard; Treasurer, Ben. P. Mann; Executive Committee, the officers and Dr. W. S. Barnard, P. R. Uhler and Dr. A. J. Shafhart.

The first regular monthly meeting of the Society was held April 3rd, in the Council Chamber of the U. S. National Museum. The following papers were read:—

1. Some New Facts Concerning the late Townend Glover—C. V. Riley.
2. On Insect Collecting at Pt. Barrow, Alaska—Jno. Murdoch.
3. On the Insect Fauna of the District of Columbia—E. A. Schwarz.
4. On the so-called "Mistaken Parasite."—L. O. Howard.

The active membership list of the Society numbers over twenty names. Regular meetings are held on the first Thursday evening of each month.

L. O. Howard, Corresponding Secretary.

Change of Address.—The Rev. F. W. Fyles has removed from Levis, P. Q., to South Quebec. Parties sending him communications will please bear in mind this change.

The Canadian Entomologist.

VOL. XVI. LONDON, ONT., APRIL, 1884. No. 4.

NOTES ON THE ENTOMOLOGY OF VANCOUVER ISLAND.

BY GEO. W. TAYLOR, VICTORIA, B. C.

Since I came to this island, a couple of seasons ago, I have made a practice of capturing any insects that came in my way, and I have sometimes made an expedition purposely in pursuit of such prey. The result is an accumulation of about one thousand species of all orders, which probably represents not more than five per cent. of our insect population.

As my favorite studies are in another department of Zoology, I have neither the inclination nor sufficient knowledge to work out all this material myself, but with the help of entomological friends, resident, alas! sadly, too far off, I am gradually making progress with the naming of my captures, and I propose, with your permission, to publish from time to time in the CANADIAN ENTOMOLOGIST, lists, with notes, of the species that have occurred to me. I hope that this will be both useful and interesting to Eastern entomologists, as I notice that hardly more than one half of the insects I have already identified are named in the recently published check list of Messrs. Brodie & White, and many of them will prove, I think, new to science.

This month, however, I will content myself with a few general and preliminary remarks. Our climate (I am speaking only of the south-easterly portion of Vancouver Island) is supposed to resemble that of the south of England, but I should call it decidedly milder. Our spring is warm and early, and the summer hot and dry, but with cool nights and copious dews. On the other hand, the winter is mild, and for about three months exceedingly wet. All kinds of vegetation are very luxuriant. The uncultivated lands are thickly covered with heavy timber, and the cultivated lands are at present few and far between, which makes it easier to combat the attacks of our noxious insects (and of these we have not a few). All our climatic conditions, except perhaps the wet winter, are favorable to abundant insect life, and this undoubtedly exists here. There are several points about our insect fauna that cannot fail to strike an observer. In the

first place the extreme abundance of Diurnal Lepidoptera must attract attention. Nearly 40 species may be marked *abundant*. A patch of blossom in May, covered with *Blues* and *Frittillaries*, with an occasional *Colias* and two or three magnificent species of *Papilio*, is a sight such as an English entomologist, at least, never sees at home, and later in the year the hundreds of *Vanessa*, *Chrysophanus*, *Pamphila and Limenitis* make a very different but not less beautiful picture.

The Orthoptera, too, intrude themselves upon our notice. Grasshoppers in thousands exist in some localities, and do considerable mischief, and large and gorgeous species, with red or yellow under wings, astonish the uninitiated by their sudden appearance or equally sudden vanishing. Two kinds of Cricket fill the air with music in early summer, and a couple of species of *Cicada* lend them most efficient aid. Of Hemiptera, Neuroptera and Diptera I have not collected many, perhaps only 200 species in all, but they include some remarkably fine kinds. Among the Coleoptera I am struck with the abundance of *Adephaga*, many of them, too, being of large size. The genera *Calosoma* (e. g. *tepidum* Lec.), *Cychrus (marginatus* Dej. and *angusticollis* Fischer), *Carabus (tædatus* Fabr.), *Omus (Dejeani* Reiche and *Audouini* Reiche), *Holciophorus*, *Promecognathus*, &c., being represented by very fine species. The Longicornes, too, are abundant, and most of them are absent from Brodie & White's list. The Elateridæ and Buprestidæ are also numerous; in fact all wood-feeding insects seem to abound, as do carrion feeders, while on the other hand, Lamellicornes are very scarce.

Our Hymenoptera are fine and interesting; the *Vespas* are in fact decidedly *too* fine. *V. maculata* Fab., *V. media* Oliv., and a supposed new species, being remarkably plentiful and pugnacious. Less plentiful, but no less conspicuous and interesting, are the Uroceridæ, my first five specimens proving to belong to as many different species.

Nearly one hundred species of Hymenoptera (about half my collection) have been identified for me through Mr. Brodie, of Toronto, and they are consequently most of them included in his check list. These shall form the subject of my next communication, and in concluding for the present, I may mention that my duplicates and the loan of my type specimens in any particular family or order will be accorded with very great pleasure to any specialist who will favor me with a request for the same.

NOTES ON THE TORTRICIDÆ.

BY PROF. C. H. FERNALD, STATE COLLEGE, ORONO, MAINE.

At the time when my Catalogue of the Tortricidæ was published, I was inclined to believe that *Cacœcia transiturana* Walk., and *C. obsoletana* Walk., were the same species, for they were taken in the same localities, and only females of the former and males of the latter species were to be found in collections.

Prof. Forbes has recently sent me two examples for determination, which he bred from two lots of leaf-rollers on the strawberry, in Illinois, and from each lot he obtained males and females, all the males being *obsoletana*, and all the females *transiturana*. We may, therefore, consider the question settled by Prof. Forbes, and these two insects are only the two sexes of our species, which should be known as *Cacœcia obsoletana* Walk.

When I was examining these insects, I was struck by the close resemblance which the males bore to *Cacœcia zapulata* Robs. Of this species only two examples, both males, are at present known; one, the type, taken in Illinois, and the other, now in Prof. Riley's collection, taken in Missouri. *C. zapulata* is considerably larger than *obsoletana*. It is hoped that Prof. Forbes will be able to settle the question whether these two are distinct from each other or not. He will undoubtedly give us the early stages of *obsoletana* in his report.

In the Bulletin of the Entomological Commission, No. 6, page 82, Prof. Riley expresses the opinion that *Teras oxycoccana* Pack., *T. cinderella* Riley, *T. malivorana* LeBaron, and *T. vacciniivorana* Pack., are dimorphic forms of one species. At the time when my Catalogue went to press, I thought it better to allow them to appear as distinct, but made the statement in a foot-note that "surely *oxycoccana* Pack. must be distinct." I had the type of *oxycoccana*, and did not feel prepared to admit that an insect so unlike the others could be the same thing.

During last summer Mr. J. B. Smith collected and raised a large number of the so-called cranberry worms in New Jersey, and many were sent to the Department of Agriculture and bred there, so that there seems to be no doubt that Mr. Smith and Prof. Riley have proved the dimorphism of the insect. Mr. Smith had the kindness to send me a considerable number for examination, but they were all the slate-colored form, or *T. cinderella* Riley. I therefore wrote to Prof. Riley, who sent me a gener-

ous supply of all the forms bred. There were the plain slate-colored form, the slate-colored with red scales mixed in, and the orange-colored form, the *malivorana* of LeBaron, which, without much doubt, is identical with *vacciniivorana*, though the type of the latter is lost, and we now have only a brief description to determine it by. Now, what greatly surprised me in the examination was to observe at once that the orange forms were *Teras minuta* Robs, which was re-described by Zeller as *Teras variolana*. I have, for several years past, taken a *Teras* here in considerable numbers, late in September, which I have sent to several correspondents in Europe, who have written me that they were quite unlike anything there. These proved to be like the slate-colored and red mixed form mentioned above, except considerably larger; I can see no difference except in size. There is no cranberry growing where these are found, but other related plants, as blueberry, upon which they might have fed. My impression is that they hibernate in the imago state, but of this I am not sure. A few years ago I received several specimens from Mr. G. M. Dodge, of Glencoe, Neb., "bred on wild rose," which are so like those taken here that I could separate them only by their greater depth of coloring and their much larger size, for they are as much larger than those taken here, as these are larger than those from Prof. Riley, and others from Texas. I received *T. minuta* from Mr. Dodge, and also from Mr. Morrison, taken in Nevada, and they were also unusually large. I am, therefore, inclined to believe them all the same species, but I am not yet ready to concede that *oxycoccana* is the same thing. It will be better to allow it to remain separate till it can be proved to be the same, rather than to unite them now, and have to separate them later, should they prove distinct.

The synonomy is as follows:

Teras minuta.

Tortrix minuta, Robs., 1869.
Tortrix malivorana, LeBaron, 1870.
Tortrix vacciniivorana, Pack., 1870.
Teras variolana, Zell., 1875.

The above are the orange forms.

Tortrix cinderella, Riley, 1872.

Riley's name may be used to indicate the slate-colored form.

Robinson's *T. minuta* was published in February, 1869, and Packard's *T. oxycoccana* not until April, 1869.

In December, 1878, I visited Prof. P. C. Zeller, and examined the

types of his N. A. Tortricids. At the time, I did not feel satisfied that *Sericoris argyrœlana* Zell., was distinct from *S. coruscana* Clem., but allowed both names to remain. After Prof. Zeller's death, his collection passed into the hands of Lord Walsingham, and I wrote to him about the matter. He made an examination and wrote me that they were identical, and that Prof. Zeller had evidently reached that conclusion, for he had placed them together in his collection.

I have recently examined a large number of examples of the European and American *Phoxopteris comptana* Frol., and compared them critically with *Phoxopteris fragariæ* Walsh & Riley, and I am convinced that they are the same thing. They are structurally identical, and my European specimens shade off into cinnamon-colored forms, so that I can find no line of distinction between them. The insect must, therefore, be known hereafter as *Phoxopteris comptana* Frol.

SOME FRAGMENTS OF INSECT STATISTICS.

BY THOS. E. BEAN, GALENA, ILLS.

* Pupal Term of Arctia nais.

♀ found June 16, 1875, laying eggs in a depression in ground recently dug. Total number of eggs obtained about 500, 16th to 19th of June.

Larvæ began to appear June 24th. They were fed chiefly on *Polygonum acre*, and one or two species nearest allied to *acre*, partly on *Polygonum aviculare*, var. *erectum*, and partly on red clover.

Pupation began July 23rd, and continued daily to August 8th, inclusive; a few more pupæ formed to the 16th inclusive, when pupation practically ceased. Only 5 pupations occurred later; two about 20th of August, one about 1st of October, and two in the last ten days of October.

After losses from larval mortality and escapes, there remained August 16th nearly 200 larvæ, almost mature. These shortly made final moult and early in September almost ceased feeding. The hybernating disposition took possession of them, and out of nearly 200 mature larvae remaining Sept. 1st., not more than three formed pupa before winter.

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* Gladly giving some attention again to entomology, after several years neglect, I find a few of my former notes, which, as far as they extend, were carefully made, and may be of some use in supplementing other records, or for comparison of localities.

Pupal mortality, none.

Pupal hybernation, none.

Of the outcome from the pupae thus obtained previous to winter, the sex was noted of 196, 115 being males, 81 females.

The pupal term and mature sex of 165 were carefully recorded, summing up as follows:—

Pupal term nearest	10	days,	2	males,	8	females.
"	"	11	"	14	"	34	"
"	"	12	"	40	"	21	"
"	"	13	"	37	"	3	"
"	"	14	"	6	"	no	"

Average pupal term of 99 males, closely 12⅓ days.

" " 66 females, " 11⅓ "

The pupations of early dates produced a large excess of males. The earliest 10 pupae, July 23rd and 24th, gave 9 males and 1 female. From 43 pupations dating July 23rd to 27th inclusive, resulted 32 males and 11 females.

Pupae of intermediate dates, especially from July 28th to August 3rd inclusive, gave about equal numbers of both sexes.

In the later dates the males were again considerably in excess.

In spring of 1876 two *Arctia nais* larvae were collected; one gave pupa May 18th and male imago May 31st—pupal term 13 days; the other pupated June 15th, and female moth emerged June 27th—pupal term 12 days.

Hybernation of Spilosoma acræa.

This moth was rare in vicinity of Galena in 1875. Three larvae collected Sept. 19th and one Oct. 21st.

One made pupa Oct. 8th, the others Oct. 23rd to 25th. Moths appeared the following April, 17th to 26th, 2 males, 2 females.

The larvae showed no disposition to hybernate, although reaching mature stage so late in the season.

Spilosoma virginica.

Larvæ collected in September, 1875, spun up late in Sept. and during Oct., and moths emerged the next spring in cool room April 24th to May 9th. No observable tendency to larval hybernation.

Extreme color-variation found among the larvæ; from pale yellow to dark red-brown.

SPILOSOMA ISABELLA.

About 70 eggs were found June 7, 1876, in a compact group on a leaf of *Triticum repens.* The larvæ were fed on *Polygonums* and native asters. Record made July 12th of several larvæ of sizes from 1 inch to 1¾ inch, which differed from the ordinary pattern by being almost entirely black, and thus nearly lacking the red-brown area usually seen on the intermediate group of segments.

Nine pupæ were carefully recorded, with dates from July 15th to August 3rd:—

Pupal term 11 days—one.
" 12 " three.
" 13 " three.
" 14 " two.
Average pupal term, 12⅔ days.

The remaining larvæ were apparently all mature by August 1st, and on September 3rd there were still 22—none having pupated since August 3rd. Only one more pupation occurred before winter, dating Sept. 12th, and imago was disclosed not long after.

CATOCALA GRYNEA.

Larva found June 1st, 1876. Began forming pupa the same day. Moth emerged June 24th.

Another larva found June 11th, pupa formed June 12th, imago disclosed June 30th.

Another pupa dated July 1st, imago July 17th. Pupal terms approximately 16, 18 and 22 days.

CATOCALA ULTRONIA.

Larva found on apple-tree trunk June 5, 1876; began forming pupa June 6; imago appeared June 27.

Another larva was taken on native plum tree in garden; pupa formed June 9; imago appeared July 2.

Pupal terms approximately 20 and 23 days.

HYDROECIA SERA.

Larva found June 11, 1876, on native anemone, *Anemone pennsylvanica*, or closely allied species.

Pupa June 15; imago June 28.

MAMESTRA ADJUNCTA.

Larva, half inch long, found Sept. 16, 1875, on Celeriac. Was fed up partly on Celeriac and partly on *Weigelia rosea*. Pupated about Oct. 5, and imago appeared about 6th of following May.

Another larva was taken on *Weigelia rosea*, Oct. 4, 1875, being then 1¼ inch long. Pupated Oct. 13, and the moth appeared May 14, 1876.

VANESSA ANTIOPA.

Seven larvæ, nearly mature, were taken from a poplar tree late in June, 1875.

Two pupated June 30th, the other five July 1st; all disclosed imago July 12.

Pupal term of two, 12 days; of five, 11 days.

CHRYSOPHANUS THOE.

Female taken June 25, 1876. Placed with twigs of dock, *Rumex crispus*, one twig having a flower panicle, and upon the flowers the eggs were chiefly deposited.

Eggs laid by 28th June, and larvæ began to appear by 4th July.

Earliest pupations July 16th, others to July 21st inclusive, 29 in all.

Imagines appeared from July 24th to August 1st inclusive, 16 males, 13 females.

Pupations of earlier dates gave chiefly males; later dates gave an excess of females.

Pupal term:—

Term	8 days,	3 pupæ,	produced	3	males.			
"	9 "	16 "	"	11	"	5	females.	
"	10 "	9 "	"	1	"	8	"	
"	11 "	1 "	"	1	"			

BOOK NOTICES.

Notes on the Rearing of Silk-producing Bombyces, in 1883, by Alfred Wailly. From the Journal of the Society of Arts, 8vo., 6 pp.

Mr. Wailly has devoted much attention for the last ten years to the rearing and study of the various silk-producing Bombyces of China, Japan, India and America, with much success, the recent results of which are given in this report. The American species he has experimented with are *Telea polyphemus*, *Actias luna*, *Samia promethea*, *Platysamia cecropia*, and *Hyperchiria io*.

NOTES ON PEGOMYIA BICOLOR (Wiedemann), A LEAF-MINING FLY NEW TO CANADA.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

Egg laid on the under side of the leaf of the Dock *(Rumex obtusifolius)*. Newly hatched larva bites through to the upper surface of the parenchyma, and works under the epidermis, until the leaf presents a blistered appearance. Sometimes three or four larvæ are found in one leaf.

Full-grown larva, four-tenths of an inch long, white, semi-transparent. Segments marked with greenish yellow. Head retractile, furnished with a snout-like process, the apparent use of which is to raise the epidermis as the creature feeds. Mouth set back. Alimentary canal visible under the microscope, also two ducts terminating in spout-like organs protruding from what appears to be the *upper* edge of the somewhat truncated last segment of the larva. The tuberculose spiracles on the second segment very conspicuous; on the third, less so, and so on diminishing.

The insect left the leaf and pupated on the 22nd of September. Whilst undergoing the change it assumed a leaden-blue color.

Pupa, two and a half tenths of an inch in length; chestnut-brown; ovate. Segments slightly marked. Two considerable prominences at the head. The anal protuberances, as above described, hardened and conspicuous.

Perfect insect appeared in a warm room early in April. It presents a bristly appearance. Head, large. Front, white. Palpi, red. Eyes, full, madder brown in color. Large joint of antennæ sienna-colored, infuscated. Thorax, large and rounded, rich dark brown. Legs, sienna-colored. Wings medium sized. Costal margin thickly set with short hairs. Veins broadly marked, dark brown. Wing-sockets furnished beneath with a white fibrous edging. Halteres small and light-colored. Abdomen small compared with head and thorax, and long as compared with its own diameter, cylindrical, truncated, sienna-colored, set with long brown bristles.

I am indebted for the identification of this insect to Mr. Meade, who says: "I belive that this species has not been recorded as an inhabitant of North America, but it is very common in the north of Europe. I have bred numerous specimens from the leaves of both *Rumex obtusifolius* and *R. crispus*. Zetterstedt says it is equally common in the north of

Scandinavia as it is in England. There was no specimen of this species in the collection of American Anthomyidæ which I received some years ago from the Museum at Cambridge, Mass.

"Your specimen exactly corresponds with some of the English ones which I possess. It is rather a variable species; the 1st and 2nd joints of the antennae are sometimes nearly black, when it has been named *A. mitis* by Meigen; but they are mostly rufous. One characteristic point is that the palpi should be entirely yellow or red, *not* black at the tips as in *Pegomyia nigritarsis* Zett., a species which also mines the leaves of the Dock, in the larva state. I have bred both species from the same leaf of *R. obtusifolius*."

ADDITIONS TO CANADIAN LISTS OF COLEOPTERA.

BY W. HAGUE HARRINGTON, OTTAWA.

(Continued from page 47.)

CORRECTION.—Page 46, line 9, for "Uhler" read Ulke.

ELATERIDÆ.

Fornax badius, Mels. One specimen. The only list in which I have found this species recorded is that by Mr. Schwarz, of Florida Coleoptera.

Hornii Bv. One specimen.

Hypocoelus frontosus, Say. One specimen (given to Dr. LeConte).

Sarpedon scabrosus, Bv. One specimen of this very rare species was taken by me while beating shrubbery (June, 1880), and another was captured about the same time and given to me by Mr. Fletcher. Both were ♀, this sex having been previously unknown. They are now in the respective collections of Drs. LeConte and Horn.

Elater nigrinus, Payk. One specimen. Recorded from Michigan and Lake Superior.

**Megapenthes stigmosus*, Lec. This species is by no means rare, yet I do not find it in any of the lists which I have at hand, except that of Lake Superior species.

Agriotes oblongicollis, Mels. Rare; same localities.

Limonius aeger, Lec. Rare. A Lake Superior species.

**Corymbites vernalis* Hentz. This pretty species is some seasons quite common on the flowers of Choke-cherry, and is also found on those of Hawthorn.

**fallax* Say. Captured by beating oak, etc. Occurs with *Oxygonus obesus*, which it much resembles, but which may be readily distinguished by the elytra being spinose at tip.

**cruciatus* Linn. (=*pulcher* Lec.) This handsome beetle is taken occasionally upon Beech, and it is probable that the larvæ live in the decaying trees.

BUPRESTIDÆ.

The species of this family, as of the preceding one, are well represented here, and the individuals of some of them are very abundant.

**Anthaxia inornata* Rand. I find no record of this species in any of my lists, so that it must be rare. Three or four specimens have been taken here, but unlike *viridicornis* and *viridifrons* (which occur abundantly on various trees in June and July), it appears early in the spring, and is found on such flowers as Trillium.

Chrysobothris floricola Gory. One specimen. The species is recorded from Buffalo, Lake Superior and Florida (rare), so that it is widely distributed.

pusilla Lap. The only mention I find of this pretty little species is in LeConte's "Revision of the Buprestidæ of the United States," 1859, where it is given as from the "Middle and Southern States. Rare." Only one specimen taken by me; date not recorded.

* *Sexsignata* Say. Rare.

* *Agrilus interruptus* Lec. Rare. Occurs at Buffalo.

putillus Say. One specimen of this diminutive species, which I find also recorded from Michigan.

Sp. ? A specimen easily distinguished from any other small species by its less elongated form. I was informed by Dr. Leconte that it was unknown to him, and Dr. Horn states that the species is not in his cabinet.

LAMPYRIDÆ.

Podabrus nothoides Lec. ? My determination of this species is by Dr. Leconte's "Synopsis of the Lampyridæ of the United States," where it is described as a new species, occurring in Mass. and at Lake Superior. Rare.

MALACHIDÆ.

Malachius Ulkei Horn. Three ♂ specimens captured while beating bushes. Dr. Leconte, on seeing these beetles, considered them to belong to a new species, but Dr. Horn, on examining one, immediately recognized it as belonging to the above species, which was founded by him upon a specimen from Dakota, loaned by Mr. Ulke, in whose collection it now is. With the exception of *M. æneus* Linn. (an introduced species in the Eastern States) the members of this genus were formerly considered peculiar to the Western fauna, being found chiefly in California. I now find that there is a specimen in the collection of the late Mr. Billings, labelled "*Anthocomus lateralis*," making four specimens (♂) from this locality. The female yet remains to be discovered.

PTINIDÆ.

Hemiptychus punctatus Lec. Rare.

Dinoderus punctatus Say. Rare.

SCARABÆIDÆ.

The species of this interesting family are not numerous in these northern latitudes, nor are the individuals, except of the commoner species, in any way abundant.

Aphodius hyperboreus Lec. A dead specimen (♀) found floating on the South Nation River at Casselman. The species was described by Leconte in Agass. Lake Sup., p. 225, and occurs from Lake Sup. to Oregon.

CERAMBYCIDÆ.

Phymatodes thoracicus Muls. I am indebted to Mr. Fletcher for a pair of these longicorns, which I believe are an introduced European species. Mr. Fletcher was fortunate enough to obtain several of them from an old wine-cask.

Callidium aereum Newm. I am also indebted to Mr. Fletcher for a fine specimen of this beetle taken upon pine at Hull.

* *Purpuricenus humeralis* Fab. This handsome beetle is already recorded from Canada, but from what localities I have not been able to find out. In the classification of Leconte and Horn it is stated to occur in the Middle and Western States. None of the lists which I have contain it, so that it must be comparatively rare. I was

therefore much pleased to capture a pair last summer. The ♂ was taken near Rideau Hall on 27th June ; the ♀ on Sparks Street in the centre of the city, on 11th July.

Microclytus gazellula Hald. is also a species belonging to the Middle States, and is given in my Michigan and Buffalo lists. It is an elegant little beetle with the ant-like form and movements of *Cyrtophorus verrucosus*, which it closely resembles. Only three specimens found, on Hickory and on Sumac flowers in July.

Leptura saucia Lec. This Leptura occurs on flowering shrubs, and is the smallest species which I have taken. It is rare here, and is not given in any of my lists.

Monohammus maculosus Hald. A fine ♂ of this species was captured late in September three or four years ago. As it resembles pretty closely the very common beetle, *M. confusor*, I thought I might have overlooked specimens previously, but a careful watch since then has not revealed any. It is recorded from Lake Superior.

Goes pulverulentus Hald. This fine insect is rare on Hickory during July. Occurs also at Buffalo.

Leptostylus parvus Lec. One specimen of this rare beetle.

Liopus punctatus Hald. Rare, only three captured. Neither this nor the preceding species is included in any lists to which I have referred.

Saperda mutica Say. On the 15th July, 1882, I captured a pair of these prettily marked beetles on decaying willows. It is recorded from Buffalo.

(To be Continued.)

THE SURVIVAL OF THE FITTEST AMONG CERTAIN SPECIES OF PTEROSTICHUS AS DEDUCED FROM THEIR HABITS.

BY JOHN HAMILTON, ALLEGHENY, PA.

The ultimate extinction of many species of Coleoptera in the vicinity of large cities is unquestionable, especially of the larger Carabidæ. The conditions of life with some are such as admit of no adaptation to the methods of civilization, and for them no refuge from the encroachments of agriculture will eventually remain. They are now retiring, retiring, and

in time the last goal will be reached. In localities where the population is becoming dense, and all land available placed under cultivation, many fine species that once were common are now rarities and others fast becoming so. It is less than half a century since Mr. Randall described eighty four species from localities in Maine and Massachusetts, most of them common; but, according to Mr. Austin, in the same places several of these species are now extinct and many of them have become rare. The Coleopterist of Cincinnati, or of Buffalo, of a couple of hundred years hence, who shall be fortunate enough to possess one of Mr. Dury's, or Mr. Reinecke's lists of local Coleoptera, will no doubt have occasion to mourn over the absence from his Fauna of many of the choice forms there registered. And, by the way, the value of local catalogues would be greatly enhanced by indicating the comparative abundance of the individuals and other matters, as is done by Mr. Schwartz in his "List of Species Collected in Florida."

The foregoing is preliminary to a consideration of the probable future of several species of Pterostichus of wide distribution occurring here, as deduced from their respective habits of life and powers of adaptation. The references are to this locality only.

1. *P. adoxus* Say occurs commonly eastwardly of the Mississippi and northwardly from Tennessee and Carolina. Here it is moderately abundant, being usually found under the bark of fallen timber, or under chips and stones in its vicinity. The larvæ probably live about decaying wood. This species is not likely to become entirely extinct.

2. *P. rostratus* Newm. has the same range as *adoxus*, extending further south. It is much less abundant. It seems to have similar habits. Here it is about extinct, only three specimens having been taken in ten years; but fifty miles south-east, along the base of the Allegheny Mountains, it is not uncommon.

3. *P. diligendus* Chand. occurs from Virginia to Canada, eastward of the Mississippi. It is very abundant here, and, from its habits, will likely survive. It is found in many of the ravines on hill sides formed by springs, following them to their origin, and when found on low ground it is owing to their having been brought down in freshets. It is a moisture lover and is never found in dry places. Its larvæ live in the banks of these hillside rivulets in ground that is constantly damp.

4. *P. honestus* Say is not often found here, and then either under the bark of fallen timber in wet places, where it probably feeds on small

cryptogams, or in certain kinds of woody fungus. Not much can be said about it, but it will probably become extremely rare.

5. *P. obscurus* Say is now a rarity. It appears to be a delicate species, totally incapable of any adaptability to change of surroundings. It is found in the woods under stones, near the top of hills, in places where the soil is light and friable. It must soon disappear from this Fauna.

6. *P. stygicus* Say will be a beetle of the future, having adapted itself to a great variety of conditions. It is equally at home in field or forest, in the river flats, or on the mountain tops. It is common in nearly all the Northern States.

7. *P. relictus* Newm. is not a common nor an abundant species. It occurs occasionally in the valleys among the hills, in wild places, under chips or stones, but more frequently on the rugged, sloping banks of ravines, where the soil is light and friable without much moisture. From the nature of its habitat it may long exist as a rarity, unless the beetle hunters of the future should become so numerous as to destroy the plant.

8. *P moestus.* This large and graceful species is now moderately common, being usually found in open woodland about wood in process of conversion into humus, in which it probably oviposits. In time it can scarcely fail to become rare, as its beauty will cause it to be much sought for, and its habitat become more and more limited. Those who desire to have it with the rich purple of its elytra intact, should never place it in æther or in alcohol, which transmute this color to black.

9. *P. Hamiltoni* Horn occurs usually on plateaus on the sides of hills, where there is a dry friable soil with herbage and timber. It is mostly found under flat stones, generally from two to four together, and makes little effort to escape capture. It has only been discovered here in two limited localities, and its annihilation is only a question of time. Forty miles south it appears to be abundant, probably extending along the base of the Alleghenies into Maryland.

10. *P. Sayi* Brulle, living as it does in low ground and among rank vegetation in places subject to inundation, will survive.

11. *P. Lucublandus* Say is ubiquitous. Having, like *stygicus*, great powers of adaptation, its future is assured.

12. *P. luctuosus* Dej. oviposits under drift on alluvia along rivers and their influents, and will probably continue more or less abundant. This, and species with a similar habitat, can scarcely be altogether exterminated,

for, should they disappear for a time, re-colonization by river transportation can scarcely fail to occur.

13. *P. corvinus* Dej. The mature insect is found under rubbish and decaying vegetation in and around swampy places. The larvæ live in the swamp and may be found full grown about the beginning of June. They are entirely luteus except the mandibles, which are brown and very powerful. The head is as large as the first thoracic segment, and the outline of the larva is fusiform. Each abdominal segment has at the sides three long appendages. As there are only a few swampy places in this vicinity, and these all susceptible to drainage, extinction is a matter of course.

14. *P. purpuratus* Lec. This handsome species is common here, though generally it must be rare, being always in demand. Its habitat is plateaus on hill-sides and along the base of rugged elevations, where there is a dry light soil and some low vegetation, as *Nepeta glechoma*, *Stellaria*, *Claytonia*, *Dielytra Canadensis*, etc. Agriculture is its enemy, and its beauty will induce the beetle hunters of the future to pursue it to extermination in the few places to which it must finally retreat. Alcohol changes the purple of its elytra to black.

15. *P. mutus* Say will survive. It seems to be a progressive insect; though preferring its native woods, it is becoming, so to speak, domesticated, gradually accommodating itself to cultivated places. There is a marked difference between those bred in fields, for, presumably, four or five years, and those taken in their native haunts. The former are on the average larger, have the base of the thorax more coarsely and densely punctured, and the elytra more deeply striate and less polished. So different in appearance are the extremes, that, by destroying intermediate forms, they might be separated into species.

16. *P. erythropus* Dej. is a hardy species, though not very abundant; and, as it inhabits in high or low ground, whether cultivated or in a state of nature, it is likely to be long a surviver. The individuals found here have the feet piceous black, while those of New Jersey and Massachusetts have them bright ferruginous, the typical color; otherwise no difference is observable.

The sixteen species above mentioned are all of the genus now occurring here. Their survival in this Fauna, as deduced from the foregoing, may be thus summed up. Four must soon become extinct. Six may

possibly exist in the future as rarities. Four *(diligendus, Sayi, luctuosus, mutus)* will occur not uncommonly, while two *(stygicus* and *lucublandus)* will remain, as now, common.

It may not be out of place to remark that with two exceptions, the individuals of these species do not vary notably from a certain type belonging to each ; and that these two, namely, *stygicus* and *lucublandus*, are the ones that possess the greatest power of accommodation. *Adoxus* varies in regard to the posterior angles of the thorax, but all the individuals of each locality conform to one type, so far as observed.

So far as known, none of them are in any way injurious to man, or to vegetation ; and in the absence of such a record, may be set down as beneficial, owing to the carnivorous habits of the larvæ. In fact, except as to their mere existence and the mode of distinguishing them by external anatomical differentiation, entomological literature is silent.

THE ENTOMOLOGY OF VANCOUVER ISLAND.

Notes on Eighty Species of Hymenoptera Collected near Victoria, Vancouver Island, in 1882.

BY GEORGE W. TAYLOR, VICTORIA, B. C.

All the insects mentioned in the following notes were captured by myself during the season of 1882, which was my first year in this island, and were taken for the most part on flowers in the course of my rambles. Some of the Ichneumons, however, were bred from the pupæ of Lepidoptera, and a few species were taken at rest, at light, or in other more or less usual ways.

The eighty species here enumerated have been examined and determined for me by Mr. W. Brodie, of Toronto (to whom I am much indebted for this and other kindnesses), and they are therefore nearly all of them included in the check list issued last year by the Natural History Society of Toronto. In fact, the only names that I do not find in that list are *Halictus lævipennis* and *Eurra albitarsis*, but they may perhaps be there under other names which in my ignorance of synonymy I fail to recognise.

Both species and specimens of Hymenoptera appear to be very numerous here, and a large collection might soon be amassed by any one with time and inclination to work at it; but as I stated in a previous paper, I do not possess either of these qualifications, and my labors in British Columbian entomology will be probably confined, I fear, to the laying of a very slender foundation on which future workers may build.

It will be noticed that some common Eastern species are also abundant here, for instance, *Vespa maculata*, the three ants, *Trichiosoma triangulum*, the two *Pimplas*, and some dozen others, but, as might be expected, the majority of our Vancouver insects are of a distinctly Western type.

It would perhaps have been wiser to have waited until I could have identified all my captures, as I have now over two hundred species, and have published a more complete list and with fuller notes, the present being little more than a list of names; but on the other hand, facts in science cannot very well be put on record too soon, and if we wait to perfect our work, we may have to wait a very long time.

I have sent to Mr. Saunders, for the Ontario Entomological Society's Collection, a box containing duplicates of some of the under-mentioned species, and in process of time will, all being well, forward others. In this way I hope that the insects will come under the eyes of many entomologists learned in this particular branch, and if any such gentleman should detect error in their naming, I shall be exceedingly obliged if he will communicate his corrections to me.

The arrangement followed in these notes is that of the Check List alluded to above.

HYMENOPTERA.

Apidæ.

1. *Apis mellifica* Linn. Abundant in the usual domesticated state.
2. *Bombus centralis* Cress. Only one specimen captured, but it may nevertheless be common.
3. " *Vancouverensis* Cress. Very common.
4. " *occidentalis* Greene. "
5. " *lacustris* Cress. "
6. " nov. sp.? A few specimens were taken of a *Bombus* which Mr. Brodie considers probably new. I will, however, defer description until after further investigation.

7. *Apathus elatus* Fab. Not rare.

Andrenidæ.

8. *Andrena hilaris* Smith. A few only, on flowers.
9. " *hirticeps* Smith. " "
10. " *miserabilis* Cress. Abundant.
11. *Halictus coriaceus* Smith. A few only.
12. " *ligatus* Say. Common.
13. " *discus* Smith. Common.
14. " *albitarsis* Cress. Common.
15. " *lævipennis.* This name does not appear in the Check List, but the insect so named by Mr. B. is remarkably abundant. There are numerous other species of *Andrena* and *Halictus* not yet determined, some of them being very plentiful.
16. *Colletes thoracica* Smith. Not common.
17. *Osmia lignicola* Prov. Not common.
18. *Megachile brevis* Say. Abundant, resting very often in the burrows made by *Buprestis lauta* Lec.
19. " *mendica* Cress. Also very common.
20. *Ceratina tejonensis* Cress. Rare.

Vespidæ.

21. *Vespa maculata* Fab. Only too numerous, building enormous nests of more than a foot in diameter. I suppose it is equally abundant in the eastern provinces.
22. " *media* Oliv. Common. The suspended nests of this wasp are very noticeable in early spring.
23. " sp. A species which Mr. Brodie could not determine. It is of the size of *V. media.*
24. " sp. Another *Vespa* which may be a new species. It is exceedingly abundant and remarkably savage. The sting, too, is more than ordinarily painful. Its nests are subterranean, and the racoons evidently consider the comb a favorite morsel. These animals probably destroy the greater number of nests before the close of the season, and if it were not for this check, I am afraid the insects would soon become an intolerable pest. Being so common here, I shall be pleased to send a long series to any Hymenopterist who will send me a box.

Eumenidæ.

25. *Odynerus blandus* Sauss. Very common.
26. *Eumenes globulosus*, Sauss. "

Crabronidæ.

Owing to my desultory mode of collecting, I have not taken many species of this family. The only one I have named is

27. *Cerceris deserta* Say., which is not uncommon.

Nyssonidæ.

28. *Gorytes laticinctus* Prov. Common.

(To be Continued.)

CORRESPONDENCE.

AN INSECT ATTACK ON AN IULUS.

Dear Sir: A friend—a careful observer of insects and their ways, although not an entomologist—has communicated to me the following statement:—

"Once, and once only, and that many years ago, I saw what seemed to my uneducated eye, a swarm of minute gnats making an Iulus unhappy. He was hastening as fast as his numerous legs could carry him across a wood road—they hovering over him, darting on him, and he stopping and biting at them angrily, and then moving on. It seemed to me that they were puncturing him. Were they ichneumons? If not, what were they?"

I would be glad to learn if any similar occurrence has ever been observed, or if any plausible explanation can be offered for so singular an insect demonstration. I am not aware that parasites ever make a combined attack in the manner above described.

Albany, May 13, 1884. J. A. Lintner.

Change of Address.—W. F. Kirby, from 5 Union Road, Tufnell Park, London, N., England, to 2 Burlington Gardens, Chiswick, London, W.

A. W. Putman Cramer, 51 Douglas St., Brooklyn, N. Y., wishes to exchange Canadian Noctuidæ and Geometridæ for Lepidoptera of the world, and would be glad to correspond with any one desirous of making such exchanges.

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The Canadian Entomologist.

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NOTES ON BUTTERFLIES, WITH DIRECTIONS FOR BREEDING THEM FROM THE EGG.

BY W. H. EDWARDS, COALBURGH, W. VA.

I am asked to write for the CAN. ENT. a paper on breeding butterflies, and on taking observations of the larval stages, and I comply with pleasure, hoping that what I shall say may be the means of inducing some collectors to cultivate this field. There are many local collections of butterflies in Canada and the United States, and a few general North American collections, more or less complete. But their owners are mostly satisfied with mere collecting and accumulating specimens of the imago. Very few know anything of the larval and other stages of the butterflies, unless of some of the common species. And where anything is known, very little is given to the world. Some collectors, however, have also been breeders of butterflies, sphinges and moths on a large scale. As for example, our friends, John Akhurst and Professor Julius E. Meyer, of Brooklyn, each of whom could fill a good-sized volume, if they would relate one half of what they know on these subjects. Such an one was the late William Newman, of Philadelphia, who lived to a good old age, and had spent his spare hours for many years in collecting and breeding lepidoptera. But none of these gentlemen have published a line that I am aware of, and the entomological world is not much the wiser for their private experience. So that practically here is a great field almost unworked. Even in Europe, very little systematic work has been done in this department with the butterflies. Apart from mere collecting, I do not see that anything of consequence remains to be done, either in North America or Europe, with the butterflies, except to study their life-histories. Both continents have been well explored, and only now and then can a new species be found. One collection is pretty much the same as another. To be sure, there is the anatomy of the butterfly or of the larva, but to study that requires special training, and this few have the inclination or the facilities for acquiring. But the study of the life history requires no

special training. Any one can take it up and follow it with a pleasure that rapidly becomes absorbing. Especially to dwellers in the country, or to those who spend some weeks in summer in the country, is this to be commended. And to any one who needs a hobby, the collecting of butterflies and breeding them from the egg, will give the physical and mental exercise they seek. A few days ago, a wealthy man, retired from business, in one of our cities, driven to despair from mere inaction, shot himself, in the fear that he would go mad. And one of the daily papers improved the occasion to preach the importance of hobbies, whether it be the raising of cabbages, or collecting pictures or china, or the study of archæology or of natural history. A man mounted on his hobby "does not suffer from vain regrets of his past career. He has found something more absorbing, more elevating, more pleasing. His hobby suffices him, gives him an interest in life, and prevents his nerves from preying on his health." I knew of a lawyer who at sixty was ordered by his physician to find some employment out of doors which would occupy his time and thoughts, unless he wished to be speedily gathered to his fathers ; and he conceived the idea of making a collection of limestone fossils, as they were abundant in the region in which he lived, though hitherto he had known nothing of fossils or of natural history. And this he followed with delight for years, chiselling out the beautiful fossils as laboriously and skillfully as if stone-cutting had been his trade, studying them and arranging them in cabinet. He lived twenty happy years after that change of base, and left a collection which is famous for its magnitude and value. And, on the other hand, we have all known men who in the prime of their mental and physical strength have retired from active business, and have died from sheer vacuity of mind, after twiddling their thumbs in an armchair a few years, who might have reached four score if they had some hobby to ride. So I commend butterflies to elderly gentlemen or retired gentlemen in need of an occupation. The young need no recommendation. It is always enough to show them the way in any branch of natural history, and they follow it with ever increasing enthusiasm. Studies of this description keep young people out of mischief and old people out of the grave, and that is one good reason for cultivating natural history.

And now to our subject. Most female butterflies lay eggs readily in confinement, if shut up with their natural food plant. What that is cannot always be known, but it is well to try plants which allied species feed on. In most cases allied species feed on the same group of plants. Thus

Phyciodes *Tharos* eats any sort of Aster, and so will Melitæa *Harrisii*. I had larvæ of Eresia *Texana* sent me from Texas, and offering them Aster, they took to it forthwith. Mel. *Chalcedon*, in California, feeds on Penstemon, Scrophularia, etc., but larvæ sent me readily eat the leaves of *Chelone glabra*, on which M. *Phaeton* feeds here. So, in case of doubt, it is best to try such plants as allied species feed on. What these are may be learned from the books, in many cases. Mr. Scudder, in 1869, drew up a list of food plants of butterflies, for the American Naturalist, and I have very often had occasion to refer to it. So, the same author, in "Butterflies," 1881, gives a list. Scattered through the volumes of the CAN. ENT. is much information of the same character.* Sometimes there is no clue, and more or less experimenting is necessary. In CAN. ENT., vii., 161, 1875, Mr. Mead relates his discovery of the food-plant of P. *Tharos*, "which had baffled all my endeavors for the past four or five years, during which I have tried a great number of plants without avail." He relates that he prepared a large box by filling it partly with earth, and transplanting into it specimens of all the common compositæ he could find. The box was covered with gauze and about a dozen females of this butterfly were introduced. "In a few days I examined the leaves and found six patches of eggs upon one of the plants. The plant proved to be a species of Aster." Then he transferred some of the females to a box containing Asters only, and further eggs were obtained. After that, I bred *Tharos* by hundreds, one season after another, and got at its complete life-history.

In 1881, I received from Arizona several eggs and just hatched larvæ of Lemonias *Nais*. The eggs had been laid on Mesquit, and I had no idea what they would eat here. But quite a number of sorts of leaves were given them, among them peach, cherry, wild plum, and after nearly all the larvæ had died from starvation, it was found that the survivors were eating the plum. So of the larvæ received I was able to get one example to pupa and imago on plum. Mr. Scudder wrote me: "You have filled one of the greatest voids in our knowledge of the biology of butterflies," as little or nothing had till now been known of the history of any species of the Lemoniadæ.

Some species eat but a single plant, or sub-group of plants, as P. *ajax*,

* As soon as I can find time, I will draw up a new list of the food-plants of butterflies, and send to the CAN. ENT., and I should be glad to receive information from any one who has any knowledge of this matter.

the Pawpaw, Asimina; P. *Philenor*, species of Aristolochia (though, according to Scudder, *Polygonum convolvulus*, or knot Bindweed). On the other hand, some species are almost omnivorous, as P. *Turnus*, which is credited with eating plants in a score of genera. P. *Asterias*, and its allies, *Brevicauda*, *Machaon*, etc., feed exclusively on Umbelliferæ, carrots, fennel, parsley, etc. The Pieridæ feed on Cruciferæ, cabbage, turnip, radish, horse-radish. The Coliadæ on clover, pea, lupine, astragalus. Callidryas and Terias on Cassia. Danais on Asclepias. Argynnis on Violet, though A. *Idalia* also on a species of Aster. The Graptas on nettle, elm, hackberry (Celtis), currant, gooseberry, false nettle (Boehmeria); Apatura on Celtis; Limenitis on willow, hawthorn, aspen and poplars.

Our species of Lycæna, so far as known, on a variety of flowers, as *Pseudargiolus*, in its several forms, on dogwood, rattle-weed (Cimicifuga) and Actinomeris; *Scudderii* on lupine and on Jersey tea (Ceanothus). *Comyntas* on clover, blossoms and leaves. *Melissa* on Astragalus. Thecla larvæ I know very little about, the only one I ever saw being that of *Henrici*, which feeds on the inside of plums, wild plums, excavating the whole interior of the fruit. But many species are said to feed on leaves of oak: *Melinus* on hop, thorn, etc., F. *Tarquinius* on hawthorn. The Satyrids all feed on grasses and sedges. So Pamphila feeds on grasses and sedges; Nisoniades on herbaceous plants and shrubs.

Wherever I have lived in the country, as at Newburgh, New York, for several years, and later, at Coalburgh, W. Va., I have brought into my grounds all trees, shrubs and plants, on which larvæ of butterflies are known to feed, so far as I could get them. So that I am pretty certain to have food of almost any species close at hand. Thus, in addition to plants from the region around Coalburgh, I have Astragalus, Amorpha and Scrophularia from California, aspens from the Catskill Mountains, and even a particular nettle from the north, for V. *Milbertii*, which I found last year starved to death on our native nettles, *Milbertii* being an exotic species here.

Now, the plant supposed to be known, we wish to get eggs of butterflies laid on it. If a tree or shrub, I use a bag or bags of Swiss muslin, but mosquito netting often, especially for large butterflies, as Papilios. For Papilios, the bag is about 30 x 18 inches. For medium sized species, as Graptas, say 18 x 10; for Lycaenæ, 10 x 6, having always on hand several sizes. If there is any reason for keeping a particular female

separate, of course, put but one in the bag; otherwise several, as half a dozen *Turnus*, for example. One can judge pretty well, either by the size of the abdomen, or by the worn state of the wings, whether the eggs are mature. If the wings are worn, even though the abdomen be not swollen, it is probable the butterfly has already laid most of her eggs. Species differ in regard to the time required after impregnation for laying. Several have been known to lay within a few hours after the two sexes had been taken in copulation, but others require several days. In these last cases the eggs are not fully formed when the butterfly comes from chrysalis, in the other they are. In Argynnis *Myrina* and A. *Bellona*, also in P. *Tharos*, the eggs are mature in the new butterfly; in Mel. *Phaeton* they are wholly unformed. In the larger Argynnids about two weeks elapse after emergence from chrysalis before the eggs are mature. In many species copulation takes place as soon as the female comes forth, often before the wings are expanded or dried. Indeed, in Heliconia *Charitonia*, the males have been observed by Dr. Wittfeld to hang in clusters of four or five upon the female chrysalis, and when the shell bursts open from their weight, one of them is sure to make connection before the shell is fully removed. I have seen old males of P. *Ajax* coursing up and down a bit of woods in which these butterflies were coming from chrysalis, and ready to pounce upon any limp-winged female that came within their vision. In CAN. ENT., viii., 161–2, I related that I turned loose at Coalburgh a dozen examples, male and female, of A. *Myrina*, the larvæ of which I had brought from the Catskills, and about three hours later found a pair of them in copulation in the grass. These I got into the house and into a box, and next day set the female on a plant of violet under a bag. Within an hour she had begun to lay eggs, and within two days laid 93.

In August, 1877, I took a pair of Arg. *Atlantis* in copulation, in the Catskills, in the forest, several miles from home, and doubting if I could get them home in this condition, I tied up my net and suspended it to a branch. The next day I returned and brought in the female, which laid fertile eggs at two days and later.

Some species, however, do not seem to lay so readily as Argynnis, and have to be kept alive artificially in the manner to be described hereafter. Often, and especially for species which lay on small plants, as violet or grasses, I set the plants in pots, or even tin fruit cans, and over the tops tie bags, which are high enough to clear the plant by a few inches. To

keep the bag upright and well expanded, put three sticks in the earth at an angle. Argynnis readily lays so ; also all species of Satyridæ which I have tried ; so Pamphila. The eggs will be laid on the plants, or on the bag, and more or less on the ground. A good method also is to confine the butterflies in a large box, which is covered with a cloth. In the box either plants in pots may be set, or the plants may be rooted in earth. I prefer the former way, however, as when eggs are dropped on the earth in such circumstances, it is almost impossible to find them. Arg. *Diana* and *Cybele* lay freely in this sort of confinement, and I have generally used the box with them. They lay a good deal on the sides of the box, as well as on the cloth, but many eggs will be found on the leaves and stems of the violet. Mr. Mead varied this mode with Limenitis *Arthemis*, with excellent results, as he relates, CAN. ENT., vii., 162 : "A notch is cut in the side of any empty wooden box, through which a branch of willow or other appropriate food-plant is passed, care being taken to select a leafy spray, so as to partially fill the box with foliage ; it is then covered with gauze, tacked fast on one side, and part way down on the adjoining sides, that on the fourth side being held down by a piece of wood fastened to the remaining flap of gauze. This renders easy the examination of the contents at any time. Now a saucer of raw dried apples, sugared, and partly filled with water, is put in, and the cage is complete. Butterflies like L. *Arthemis* will live in such a vivarium for two weeks and more after their capture, and appear to enjoy the food provided immensely, laying many more eggs than if enclosed in a bag and allowed to perish of hunger and thirst." Mr. Mead says that in such a box 15 females laid over 500 eggs. I saw this lot at the time, and eggs were all over the willow leaves and the cloth. The limbs of willow were turned down as they grew, and into the box, this being placed on the ground by the brook. So where butterflies are confined in boxes with plants in pots, sugared fruit of any sort may be given. Or when a bag is tied over a pot, a small tin box with similar food may be set on the earth within the bag, and the butterflies very soon discover it.

So a glass jar may be used for small species, and I have often obtained eggs of Pamphila by this means, setting a stem of grass with its root in the jar. Mr. H. W. Nash obtains the eggs of Colias *Hagenii* in this manner ; also L. *Melissa*, without trouble. All that would seem to be necessary is that the plant should be apparently a growing one, to induce the butterfly to entrust her eggs to it.

I have often obtained eggs from Lycaena *Comyntas*, which lays on clover, or from Colias *Philodice*, on same plant, by tying a bag over the stem as it grew when in blossom, setting a stick in the earth to hold the bag upright. It is here necessary to shade from the sun, as a very short exposure to the direct rays of the sun will kill the butterflies. So in all cases where bags are tied to branches, care must be taken in this respect. It is well to pin paper over the bag, in the direction of the sun, or a piece of cotton cloth. But on account of ants, it is better to have the plant in pot, rather than in ground, and at all events, the eggs should not be left out over night where ants can get access to them. Spiders perhaps are more destructive than ants. Better bring the butterfly into the house, and tie it out again next day.

Many butterflies lay their eggs in clusters, as do the Melitaeas, from a dozen to an hundred in one patch; or Apatura to two hundred and more. The Graptas lay their eggs in strings, or singly; in the former case as many as 7 or 8 standing in a vertical column. G. *Interrogationis* often lays many eggs on one leaf, but not exactly in cluster, and the young larvæ gather into a loose colony. P. *Atalanta* lays a single egg on the topmost leaf of a nettle, or Boehmeria, and the young larva, as soon as out of egg, makes itself a shelter by weaving together the edges of the leaf. P. *Huntera* lays single eggs on species of Everlasting, and the young larva protects itself very much as does the larva of *Atalanta*. According to Mr. Scudder, Am. Nat. x., 611, P. *Cardui* lays single eggs on thistle leaves, and the young larva makes a sort of nest of bits of leaf woven together. Vanessa *Antiopa* lays its eggs in cluster around the small stem of a willow, and the larvæ are gregarious to the last. But most butterflies lay their eggs singly, one egg on a leaf, and often but one egg to the plant. Of all our Papilios, *Philenor* alone lays in a cluster, a dozen or 20 eggs in rows touching each other, and the larvæ feed in rows around the edges of their plant till at least half grown.

Certain species in larval stage are highly gregarious, as *Antiopa* already mentioned. So are the Apaturas. The fall brood of A. *Clyton* and A. *Celtis* hibernate after 3rd moult, and gather in a dense cluster on the under side of a leaf of their plant, heads and tails, as close as they can pack. On 21st Sept., I found 165 larvæ of *Clyton* so collected on one leaf. These Apaturas are unprotected by web. Limenitis *Disippus* and other species spend the winter in cases cut out of the leaves they feed on, one larva to one case, and fitted as nicely as a tailor would fit a coat

to his customer. Several of the Melitaeas, as *Phaeton*, *Harrisii*, etc., live in colonies within a close web of their own construction, enlarging as their growth makes it necessary; and when the time for hibernation approaches, the web is made doubly strong. So they pass the winter, and come forth in early spring to separate somewhat, and henceforth live without shelter. So the species of each genus differ in their larval habits, and sometimes species of the same genus differ materially.

Eggs of some species hatch in three and four days, as Grapta, Colias, Pieris, and in many cases the entire period from the laying of the egg to pupation is not over a fortnight, and to imago not over three weeks. I received eggs of Agraulis *Vanillæ* from Georgia, and from hatching to chrysalis, 4 moults being passed, the period in some cases was 10, in others 12 days, the pupal period 5. Probably the egg stage was not over 4 days, which would make the entire round from laying egg to imago, 19 to 21 days. The Papilios hatch in from 4 to 6 days; D. *Archippus* the same; M. *Phaeton* about 20; P. *Tharos* 4 to 7; P. *Nycteis* about 12; Limenitis *Disippus* 5 to 8; Arg. *Diana* 15; *Cybele*, *Aphrodite*, *Alcestis*, *Atlantis* 15 to 20; A. *Myrina*, *Bellona* about 6; the large Satyrids, 14 to 28 days; the Neonymphæ, about 8 days; Libythea *Bachmani*, 4; Lycaenæ, 4 to 8; Lemonias *Nais*, about 12; Pamphila *Huron*, 4; N. *Lycidas*, 4.

The only butterflies known to me to hibernate in the egg stage are the Parnassians. The eggs are laid on Sedum in July and August, and probably the larvae come forth in the spring. At any rate, eggs of P. *Smintheus* and *Clodius*, obtained by Mr. Mead and kept in the house, gave larvae in mid-winter, or late in the winter. But the larvae of P. *Apollo*, in Switzerland, are said to come from egg late in the fall, and the larval stage to be the hibernating one. Certainly the larvae of the American species have a different habit, and the hibernation is in the egg. By keeping *Smintheus* eggs on ice through early winter of '83–'84, I retarded their hatching till 30th Jan. The eggs had been kept in an ice house at Dayton, O., but in January, as my own ice house was now filled, I sent for them. After their arrival, there being no sign of hatching, I left them on a shelf out of doors, in the shade, and forgot them. Some days after, the mercury being 55° at noon, I looked at the eggs and found some hatching. I put them at once on ice, and a few days later, the weather being pleasant, I brought them out again, and in less than a week the larvae were all hatched. I fed them on Sedum (abundant here on rocks),

and succeeded in getting several larvae past 1st moult, and one past 2nd, but all died. The stages were very tedious, and the longest lived larva reached about 40 days from egg. I think if I had let the eggs stay in Ohio two months longer, I might have got some of the larvae to imago.

It will be seen then that eggs may in many cases be sent on long journeys. Even the eggs of such species as hatch in 3 to 5 days may be sent from Maine to Coalburgh, or from Florida, or from Colorado. But if placed in glass tubes or bottles, or in tin boxes, and sent by mail, with leaves of the food plant, a journey of 6 to 12 days may be ventured on. The eggs of L. *Nais*, from Arizona, were 12 days in the mail and the larvae were in part just hatched when they reached me. I had 60 young larvae of C. *Eurydice* come last month from San Bernardino, Cal., corked up in a 2 oz. morphine bottle, which was inside a tin case. The plant, *Amorpha Californica*, in the bottle was perfectly fresh, and the larvae, as hatched, had fed on it. So Dr. Wittfeld, from Indian River, Fla., has repeatedly sent me eggs in tin, which have been out 6 to 10 days. Generally the larvae have hatched on the way, but the plant has kept fresh. The only trouble I remember has been with cruciferous plants, mustard, radish, etc., or with passion-vine. These do not bear the journey, but are apt to come decayed. But experiment has proved that such plants keep well in a corked bottle, even in the hottest weather. Eggs ought never to be sent in a wooden or paper box. Apart from the danger of a crush in the mail bag, the plants dry up and larvae will starve. Nor should cotton ever be laid with the eggs or among the leaves. The young larvae get entangled in the cotton, and the leaves will dry up the sooner for the presence of the cotton. There are several species of eggs of Canada butterflies that I should exceedingly like to get, as Grapta *J-album*, Grapta *Faunus*, Argynnis *Atlantis*, Lyc. *Scudderii*, L. *Couperi*, Pieris *Virginiensis*, Colias of any species, except *Philodice*, F. *Tarquinius;* and I shall be very much obliged to any person who will send me these or any of them.

Mimicry—I recently observed an interesting instance of mimicry in the Phalænid moth, *Tetracis lorata* Grote. While examining the flowers of a bed of May apples *(Podophyllum peltatum)* I found one of these white moths adhering to the stamens of a flower, its head towards the center and the wings being easily mistaken for the petals. By a little search another was discovered in exactly the same position.

Clarence M. Weed, Lansing, Mich.

THE ENTOMOLOGY OF VANCOUVER ISLAND.

Notes on Eighty Species of Hymenoptera Collected near Victoria, Vancouver Island, in 1882.

BY GEORGE W. TAYLOR, VICTORIA, B. C.

(Continued from page 80.)

Sphegidæ.

29. *Sphex apicalis* Harr. Very common on flowers, especially in July.
30. " *elegans* Smith. " " "
31. *Ammophila communis* Cress. Also very common later in the year.
32. " *conditor* Smith. " "

Formicidæ.

We have seven or eight species of *Formica*, but only the three following have been examined by Mr. B, and so I will insert no others in the present list. They are all abundant.

33. *Formica herculanea* Linn. The winged form is to-day (May 12) flying in countless numbers in the sunshine.
34. " *Pennsylvanica* De Geer. Very common.
35. " *fusca* Linn. Very common.
36. *Myrmica incompleta* Prov. I have taken but one or two specimens of this insect.

Chrysidæ.

37. *Chrysis cœrulans* Lepell. Only one specimen.
38. *Hedychrum violaceum* Lepell. Very abundant.

Chalcidæ and *Cynipidæ.*

I have entirely neglected these families so far.

Braconidæ.

39. *Bracon obliquus* Prov. Two males in June.
40. *Macrocentrus mellipes* Prov. Rare, July.
41. *Phylax pacificus* Prov. Very common in the early spring.
42. " *niger* Prov. " "
43. *Platysoma tibialis* Prov. One specimen only in July.

Ichneumonidæ.

Very numerous. I have nearly 40 kinds in all. The following are those already determined.

44. *Ichneumon cœruleus*, Cress. One only, flying in August.
45. " *otiosus* Say. My only specimen was unfortunately destroyed during the process of examination.
46. " *insolens* Cress. One specimen bred from chrysalis of *Vanessa cardui.*
47. " *seminiger* Cress. A few only.
48. " *segnax* Cress. Very common; one specimen was bred from the chrysalis of a *Lycæna.*
49. " *longulus* Cress. Very common; most of mine were taken at rest on apple trees in October and November.
50. " *varietus* Cress. Also common.
51. " *Vancouverensis* Prov. This fine insect is abundant, and I have bred it in some numbers from the pupa of a *Bombyx.*
52. *Amblyteles suturalis* Say. One only.

Cryptidæ.

53. *Phygadeuon crassipes* Prov. Several specimens during July and Aug.
54. " *subspinosus* Prov. " " "
55. " *attenuatus* Prov. " " "
56. *Hemiteles crassus* Prov. Common, July and August.
57. *Cryptus rufoannulatus* Prov. One female in May.
58. " *robustus* Cress. Not uncommon.

Ophionidæ.

59. *Ophion bilineatus* Say. Very common during summer and autumn, frequently taken flying to light.
60. " *nigrovarius* Prov. A single specimen returned with this name has unfortunately been destroyed.
61. *Anomalon nigrum* Prov. Several bred from pupæ of Noctuæ.
62. *Limneria valida* Cress. July.
63. " *genuina* Say. Common. A few bred from small cocoons found on bracken.
64. " *flaviricta* Cress. Common in spring.
65. " *compacta* Prov. One or two, May and June.

Tryphonidæ.

66. *Mesoleptus fasciatus* Prov. Several in July.
67. *Tryphon communis* Cress. Several, July and August.

Pimplidæ.

68. *Coleocentrus rufus* Prov. One female at rest on a fence, 31, 7, 82.
69. *Pimpla indagatrix* Walsh. Not rare. June.
70. " *conquisitor* Say. Not rare. Spring.
71. *Theronia rufescens* Cress. Numerous. Several bred from pupæ of *Orgyia*, in September.
72. *Ephialtes occidentalis* Cress. A few flying in sunshine, June and July.

Uroceridæ.

I have six species of these splendid insects. Two have been determined as follows:

73. *Urocerus flavicornis* Fab. Common in autumn.
74. " *caudatus* Cress. A single female only of this small species.

Tenthredinidæ.

Cimbicinæ.

75. *Trichiosoma triangulum* Kirby. Tolerably common, as are also its cocoons.

Tenthredininæ.

Samples very numerous. Some kinds sadly too numerous, but I have not yet collected very many species.

76. *Dolerus sericeus* Say. Exceedingly abundant, particularly in June, on flowers of Dog Daisy.
77. *Selandria halcyon* Harr. One or two only.
78. *Euura albitarsis.* One or two only. This is apparently absent from the check list.
79. *Allantus originalis* Nort. Exceedingly abundant with *Dolerus sericeus*, on Dog Daisy flowers.
80. *Tenthredo mellina* Harr. Common in spring.
81. " *rufopedibus* Nort. Common in spring.

THECLA NIPHON.

BY JAMES FLETCHER, OTTAWA, ONT.

About the middle of May, 1883, Mr. A. W. Hanham took a ♀ *T. Niphon* a few miles from the City of Ottawa. This was the only specimen at that time seen.

On the 4th May last, when walking along the Chelsea Road, near the village of Chelsea, P. Q., with Mr. Harrington, he called my attention to

a small butterfly which had just alighted on the bare road in front of us. This I was delighted to recognise as *Niphon*. Having no nets with us, a too near approach was only rewarded with the mortification of seeing the coveted prize flit lightly up to the top of some high pine trees. Subsequent to this date the weather was cold and wet for some time, and I had no opportunity to visit the locality until the 22nd of the month. On this date the Ottawa Field Naturalists' Club organized an excursion to the Chelsea Mountains for the purpose of entertaining the Fellows and Delegates of the Royal Society of Canada, and consequently we were honored with the presence of our worthy President, Prof. Saunders, who happened to be in Ottawa attending the annual meeting of the Royal Society. As we passed the locality for *Niphon* on the way, the attention of all was directed to the pines as we passed. It was the President's experienced eye which detected the first examples; three beautiful tempting specimens were seen flying round the top of a white pine about 30 feet from the ground and well up out of reach; but none were obtained.

Two days later, however, Mr. Harrington, Mr. Ami and I went out again armed with a net attached to a long bamboo. Fortune favored us at last. On the way out one female which had settled on the road was taken. When we reached the grove of white pines *(Pinus strobus)* where the three specimens had been seen two days earlier, Mr. Harrington climbed up to the top of the same tree and took two more, all in good condition. Bordering the pine grove was a field in which a great deal of the herbage was made up of *Antennaria plantaginifolia* in flower, and along the edge of this field, close to the trees, nine more were taken and two others seen. Highly elated at our success, we turned our steps homeward with twelve perfect specimens, eight ♀ and four ♂. Two days later I again re-visited the locality and met with a great disappointment. The day was intensely hot and butterflies were very plentiful. On arriving at the field I saw with delight *Niphon* three or four at a time in every direction, but my chagrin was great when on taking them one after another, I found there was hardly a presentable specimen amongst them. The locality is on the top of a hill, and for the past two days high and boisterous winds had prevailed, and this must have been the cause of their tattered state. Altogether, although a hundred could have been taken with ease, not a dozen were found worth collecting. Nevertheless, I boxed some females alive with the object of getting the eggs, and have succeeded in getting thirteen. Under the microscope they are objects of

great beauty. The shape is round with a deep depression at the summit, almost half the depth of the egg. The general color is pale green, and the surface is beautifully reticulated, the lines of the coarse netting being much raised above the surface and almost white. This gives the egg the appearance of having a white bloom on it. One egg laid on 26th May gave the larva to-day, June 5th.

The larva has already been described by Mr. Saunders, CAN. ENT., I., p. 95, and is also figured by Townend Glover in his plates of Lepidoptera, Plate B, fig. 8.

Among the specimens of the perfect insect I captured, I found there was considerable difference in the marking and beauty of the upper surface, particularly among the females. I imagine the typical colors of this sex to be a rich ruddy bronze with a green sheen, and having a black border running round the margins of the wings. This border varied much in depth; it was sometimes almost restricted to the fringe of the wings, while in others it covered about one-fourth of the surface. These dark specimens are very handsome. There is also much difference in the size of the white bars in the fringe. The under side of both sexes is very similar and varies very little. The general color of the ♂ is slaty black with in some specimens the green sheen seen on the females. A few specimens of the male had a reddish tint in the black, and a few examples had indistinct bronze eye marks where the tails are found in other species of this interesting genus. The flight of this insect is very quick and jerky, and when disturbed it often flies off to the tops of trees. When visiting the flowers of *Antennaria* for honey, it has a curious habit of slowly moving its lower wings while closed alternately up and down. The tails found in other species are represented in this one by a curve in the margin by which the long fringe gives the appearance of a little tuft of down when the wings are closed. I have about a dozen specimens to spare, which I shall be glad to give to any members of the Society who will send me a box for their transmission.

ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The annual meeting of the Entomological Club of the American Association for the Advancement of Science will be held in a parlor of the Hotel Lafayette, Philadelphia, commencing at 2 p. m. Wednesday,

September 3rd, 1884. The entomologists in attendance at the Montreal meeting, 1882, authorized Mr. J. A. Lintner, should he think best to do so, to call a meeting at Minneapolis, 1883, to consider the advisability of reviving the Entomological Club. The meeting was held pursuant to Mr. Lintner's call, and after discussion it was decided to continue the meetings of the Club under the rules previously adopted. Officers were elected, and several profitable sessions were held during the continuance of the American Association meeting. In accordance with the rules the Club is called to meet the day before the opening of the general meeting. Entomologists who desire to read communications are requested to notify one of the undersigned as early as August 15th.

O. S. Westcott, Secretary, Maywood, Ill.

D. S. Kellicott, President, Buffalo, N. Y.

PRIONUS BREVICORNIS, Fabr.

BY FREDERICK CLARKSON, NEW YORK CITY.

These beetles were very abundant at Oak Hill, Columbia Co., New York, during the months of July and August, in the several years of 1875 to 1882. Harris states that the larvæ feed on the trunks and roots of the Balm of Gilead and Lombardy Poplar. Oak Hill is a part of the old Manor of Livingston, and is notable for the variety and age of its oaks. Upon the lawn immediately in front of the dwelling are two ancient trees of the black oak variety, one of which is supposed to be two hundred years old. From the roots of these old trees these beetles would emerge during the first two weeks in July, usually appearing just after sun-down, or in the darkness preceding a shower. During the sun-light, the closest observation of the short cut lawn skirting the trees, would not reveal a beetle, but so soon as the sun rested behind the towering Catskills, these revellers of the twilight and the darkness would come forth. Their presence is quickly realized by the odor of the ♀, which is very powerful, and can readily be detected twenty feet distant. I placed a ♀ immediately after emergence in an uncovered jar, and wherever I positioned it, on the piazza or elsewhere, the ♂'s were attracted from every direction. I captured twenty ♂'s in a very few minutes. Oak Hill cannot boast of a Balm of Gilead or a Lombardy Poplar, but it is famous for its oaks, and while it is admitted that the former trees, as mentioned by Harris, serve as food for the larvæ, my observations indisputably prove that they feed also upon the roots of the oak.

CHANGE OF ADDRESS.

Our old friend, and much esteemed correspondent, Wm. Couper, late editor of the *Canadian Sportsman and Naturalist*, has removed to Troy, New York. His address is 114 Fourth street, Troy, N. Y. His many friends and correspondents will please note the change. Mr. Couper was one of the earliest observers and writers on insects in Canada, and has added much to our knowledge of insects and their habits. We are sorry to lose from among us so old and faithful a worker, and wish him much prosperity. He carries with him his love for insects and his long acquired habits of observation to his new field of labor. In the letter announcing his removal, written May 12th, he says: "The weather has been very cold for some days past and I have not seen many insects on that account, I have, however, noticed that *Hypercliiria Io* Fab. is extremely abundant on the lilac. I could have collected three or four thousand cocoons from bushes in one garden in this city."

ADDITIONS TO CANADIAN LISTS OF COLEOPTERA.

BY W. HAGUE HARRINGTON, OTTAWA.

(Continued from page 73.)

CHRYSOMELIDÆ.

My collections in this extensive family contain over ninety species, of which several are yet undetermined. The great similarity of the species in some genera and the variation in form and color of individuals in other groups render their determination difficult.

Donacia pubescens Lec. This species is readily distinguished by the dense pubesence of the upper surface, which in our other species is of metallic lustre. It was described from a specimen taken by Dr. Le Conte at Smoky Hill river, while on the W. Pac. Ry. survey between Kansas and New Mexico in 1867, (Trans. Am. Ent. Soc. Vol. II, pg. 55.) It has since been recorded from Michigan and Buffalo. Four or five specimens taken by Mr. Fletcher in a small swamp near the city, in 1878.

jucunda Lec. This beetle is apparently not rare—it is given in the Lake Superior and Michigan lists.

Zeugophora abnormis Lec. One specimen; 14th June.

Cryptocephalus badius Suffr. One specimen on foliage of *Carya amara*, 24th July. Middle and Southern States.

Pachybrachys femoratus Oliv. Taken on young pines, about the end of July, near Hull.

Galeruca 6-vittata Lec. Two specimens in June. Has been found at Buffalo.

Disonycha caroliniana Fabr. This species is apparently rare in the immediate vicinity as I have only found two ; one under a stone in May, where it had probably hibernated, the other taken on a beating net on 28th July. At the South Nation river, however, near Casselman, about thirty miles southward, I found it quite abundant last summer (23rd June), feeding upon the narrow leaf dock (Rumex verticillatis.) There appears to be some confusion, this (or another) beetle in Canada, as in the lists of the Entomological Society a label is given for "*D. Caroliniana* Oliv.," while the recent lists of the Toronto Nat. Hist. Soc., do not contain the species.

BRUCHIDÆ.

Bruchus cruentatus Horn. One captured and another seen. A pretty and very active little beetle, having a wide but more southerly range, and stated to be everywhere rare.

TENEBRIONIDÆ.

Strongylium terminatum Say. Two specimens.

MELANDRYIDÆ.

The species of this family, unlike those of the preceding one, are well represented in Canada, and the individuals of some are among the most common of our fungus-eating beetles.

Hypulus n. sp. ? Among some beetles given to Dr. Le Conte, was one which he indicated in a list afterwards sent to me, as a new species. "with deep thoracic impressions." The specimen having been incorporated in his large collections it will be now impossible to identify it or to say whether it was a new species.

*(*Mystaxis*) *simulator* Newm. Two specimens.

MORDELLIDÆ.

Mordella irrorata Lec. Rare. Recorded from Michigan but belongs rather to the middle and Southern States, and is given as not rare in Florida.

Mordellistina aspersa Mels. Several specimens taken on flowering plants, such as Spiræa, about the end of July. This beetle is stated by Mr. John B. Smith (Trans. Am. Ent. Soc., Vol. x.,) to be "the most common of our species." It cannot, however, be very abundant northerly, as it has never apparently been recorded from Canada, nor is it in Lake Superior, Michigan or Buffalo lists.

Comata Lec. Two or three specimens ; varying in color of head and thorax to the forms *picicornis* and *cervicalis* Lec., now included by Mr. Smith in this species. Recorded from Michigan under the latter names, and Buffalo under the last one.

pectoralis Lec. Rare. A prettily marked species taken by Leconte on the north shore of Lake Superior (Agassiz Lake Superior Expedition.) Evidently rare, as Mr. Smith, in his remarks on the species, states that he had seen only one specimen and that the type, nor can I find mention of its capture elsewhere. This is one of many instances in which a marked resemblance of the fauna of Ottawa to that of Lake Superior is evident.

ambusta Lec. *Var.* Two specimens. Recorded from Michigan, but is more abundant in the Middle and Southern States.

ENTOMOLOGICAL NOTES.

BY A. W. HANHAM, PARIS, ONT.

I have to record the capture of some Coleoptera in rather an unusual manner. Last week while out in the woods on one of my collecting tramps, I was attracted to an old stump by the glittering of something in the sun. Closer acquaintance did not at first solve the mystery; the bright object seemed to be buried among some debris. Further examination revealed the dried and withered remains of a small toad, the glitter being that of some Buprestidæ partly exposed in what was once the stomach of the defunct batrachian.

I carried the remains home, and with no little trouble excavated in a perfect state the following :—

Calosoma frigidum Lec.

Platynus placidus Say. Several.

Dicerca ? A pair.

A small weevil unknown to me.

Portions of *Cicindela repanda* Dej., other Coleoptera and some Diptera.

From the above list it would seem that toads can hardly be called useful, seeing that such a large proportion of their food—if we take this one for a standard—consists of decidedly beneficial insects. I will allow that they are very desirable tenants for the owners of gardens, but in the woods they must be formidable rivals to the entomologist. This year they have been unusually abundant, and the rarity of many of our beetles is no doubt caused by their rapacious appetites.

I have not taken *C. frigidum* before; the *Dicerca* is also new to me. I find it very difficult to determine my captures, and a serious obstacle to taking satisfactory notes. I am indebted to W. H. Harrington, of Ottawa, for the naming of a considerable number last winter. *C. calidum* Fabr. also seems to be quite rare here; I made special search for it this spring and found but one specimen. I took another on October 27th last year, from the heart of a decaying log. Is it double brooded in this part of Ontario? Or would it be possible for one attaining the perfect state in June to live through the summer and survive the winter? The specimen I captured in October had evidently prepared to hibernate. On June 15th, I found under stones on dry ground a pair of *Calosomas* which are entirely new to me. I expect though I could name them from the Society's collection in London.

I should have been surprised to find so large and active a beetle as *C. frigidum* falling a prey even to the biggest of toads. The Buprestidæ must also be rather tough morsels for them to digest. It will ever remain an open question as to whether "our departed friend" lost its life through its own greediness, or met a violent death at the hands of one of its many foes. I have read of some ardent collectors who secured many rare beetles by capturing and killing the toads they found in their rambles.

CORRESPONDENCE.

Dear Sir: As I am working out the *Phycidæ* and *Galleridæ* of the whole world, with the view of publishing a monograph of these families, I shall be very happy to receive boxes of Canadian and any other *Phycidæ* and *Galleridæ* to name for any of your correspondents. I only desire that when possible two or three specimens of each species may be joined to the consignment in case I should not possess the species. I will send European *Microlepidoptera* in return if desired. My monograph will comprise twelve plates, containing upwards of two

hundred and sixty species (eight are already prepared), besides two or three plates with details of neuration, etc.

E. L. Ragonot, Banker, 12 quai de la Rapee.
Vice-President of the Sociéti Entomologique de France.
Paris, France, June 4, 1884.

INSECTS SWARMING ABOUT IULUS.

Dear Sir:—The following observation may have a bearing on the facts communicated by Mr. J. A. Lintner to a late number of your paper. (See Can. Entom., April 1884, v. 16, p. 80.) Several years ago I found a large living *Iulus* surrounded by a swarm of minute Diptera, apparently similar to the species that often breeds abundantly in stale lemonade and similar mixtures. Whether the Diptera I observed were really *Drosophilidæ* or not I cannot say, because I did not examine them carefully. I saved specimens of the flies, but they have been lost. At the time that I saw them I supposed that they were attracted to the *Iulus* by the odorous fluid secreted by its lateral glands—a fluid that is quite acid—and I afterwards thought that it would be an interesting experiment to expose a specimen of *Iulus*, after irritating it thoroughly to cause it to pour out some of its secretion, in a cage out of doors, to see if these flies would not be attracted by its acid fluid. The *Iulus* which I saw in the midst of these flies did not appear disturbed by them, although they darted up and down about him, often lighting in numbers upon his back.

George Dimmock, Cambridge, Mass.

Dear Sir: While walking along the New Jersey shore of the Delaware River, near the village of Delanes, last July, I was startled by hearing some small bodies falling through the foliage of an oak tree, and as they struck the leaves it sounded as if it were raining, but as the sky was perfectly clear, my curiosity was aroused. I turned around to see what the noise was, and saw some black larvæ falling to the ground, and further investigations showed that quite a number of these larvæ had fallen to the ground from the tree, and here and there I saw several Tachina flies, I believe a species of Exorista, hovering around the larvae trying to deposit their eggs. From this I suppose that these Tachina flies had flown to the tree in search of victims, and most probably the larvae had dropped from the tree to escape their enemies. Perhaps many larvae take this method of trying to escape from their Hymenopterous and Dipterous parasites?

Eugene L. Keen, Philadelphia, Pa.

The Canadian Entomologist.

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ENTOMOLOGY FOR BEGINNERS.

BY W. HAGUE HARRINGTON, OTTAWA.

NOTES OF A JUNE RAMBLE.

My office duties prevent me, unfortunately, from going afield during almost the entire month of July in each year, and perhaps a few notes on my last ramble, 29th June, may interest the inexperienced, and indicate some of the insects to be found at this time. The special aim of this ramble was to visit a grove of hickories, *Carya amara*, and investigate the insects occurring in these trees, but I desired also to obtain Coleoptera and Hymenoptera, especially sawflies.

My outfit consisted of a flat beating-net constructed so as to be folded up snugly when not in use; a sweeping-net on a folding pocket-ring; a bottle containing coarse sawdust, with a morsel of cyanide for beetles; a wide-mouthed bottle lined with blotting paper, and having some cyanide in a cavity in the cork, for Hymenoptera, Diptera; a couple of boxes for larvæ, and last, but not least, a note-book and pencil. The day is favorable, the sun shining hotly, yet tempered by a slight breeze. My first capture is a half-grown Cimbex larva under an elm tree in the city, and in passing through the lumber yards I obtain *Buprestis consularis* and *Dicerca tenebrosa*. Along the river are seen many Neuroptera, including some fine species of Phryganidæ and Perlidæ. On the sides of a railway embankment (I am now in the Province of Quebec) grow a variety of young trees and other plants. The willows are first tried and yield very abundantly, *Diachus catarius* and *auratus*. Less numerous are *Monachus soponatus*, *Anomœa laticlavia*, *Agrilus torpidus?* and A. *fulgens*. I am pleased to capture a fine pair of *Saperda mutica*, as I have only hitherto taken them once. Among other beetles are *Trichalophus alternatus*, *Rhynchites cyanellus* and *Chrysomela multipunctata*, with larvæ of the same. On some trees a sawfly larva, yellow, hairy, with

rows of black spots, is very abundant, and there are also larvæ of lepidoptera, including one of a Catocala. The raspberry bushes, which a few days ago were alive with bees and wasps, are now almost deserted, but the wilted tips of many of the young shoots show that some enemy has been at work. It is found that a foot or so below the top they have been neatly girdled by two rings about half an inch apart, and that between these rings has been inserted into the pith a long cylindrical egg, that of *Oberea bimaculata*. From a small balsam poplar is obtained *Saperda moesta*, and an examination discloses the larvæ of different sizes in gall-like swellings, about an inch or two apart, along the shoots which are not half an inch in diameter. Near the root, where the stem is somewhat stouter, is found a much larger borer, which is apparently that of some moth. The hickory grove is now reached, and the first tree yields a fine *Saperda discoidea*, a very rare beetle here. From other trees the following beetles are abtained: *Dorcaschema nigrum*, *Liopus alpha*, *Lepturges querci*, *Leptostylus macula*, *Hyperplatys aspersus*, *Anthaxia viridicornis*, *Agrilus egenus*, *A. otiosus*, *A. bilineatus* and *Balaninus rectus*. Several tree-hoppers occur in various stages, including *Telamona unicolor* and *T. fasciata*. There are also some large flat half-grown bugs (yellow, with blackish markings,) one of which has killed a luna caterpillar about an inch long, and is sucking out its juices. The caterpillars of this moth are quite common, but generally smaller than the one mentioned, and a few larvæ of other moths are seen. Three specimens of the pretty little butterfly, *Thecla calanus*, are observed flitting about the trees, or settled upon the foliage. Space will not permit to mention the various galls, etc., which disfigure the leaves more or less. Scattered through the grove are a few oaks, some of which have the foliage noticeably disfigured by large globular woody galls placed upon the mid-rib of the leaf, which is much distorted and curled up. From these galls are just emerging small hymenopterous flies, with ample wings, of which I do not know the name. Some of the leaves are being devoured by brownish caterpillars, half an inch long, with a black head and a pair of black spines projected forward from one of the thoracic segments. They feed side by side in rows of five or six and eat the leaf from the tip downward. Upon these trees are found also the beetle *B. rectus*, which was upon the hickory, and which is remarkable for its extremely long and slender snout. Flying about through the grove are lovely butterflies, *Limenitis arthemis*, fresh evidently from chrysalis and almost persuading one to be a lepidopterist.

Descending now into a meadow, through which flows a sluggish brook, I fold up the beating-net and screw the sweeping-net into its handle, which hitherto has been only used to tap the branches with. The stream is bordered with clumps of alders, willows, etc., between which grow luxuriantly ferns and many herbaceous plants, with sedges and various grasses. Magnificent fritillaries are hovering about the blossoms of the milkweed, which are just beginning to open, while numbers of *Neonympha Boisduvalli* flit about with a peculiar jerky flight. Beetles do not appear to be as common as they sometimes are here, but I take several specimens of *Scirtes orbiculatus*, three species of fireflies and several allied beetles, with several species belonging to the other families, as Coccinellidæ, etc. Three or four kinds of sawfly larvæ are found but none of the perfect insects are seen. Two, or perhaps three, species of Chrysops are unpleasantly numerous, but are not nearly so aggressive as I find them in a pine wood, through which I return. This wood rings with the shrill music of the cicada and is enlivened by many butterflies in the more open portions, where other trees and plants occur. My captures during the ramble are perhaps fifty species of beetles and a few Hymenoptera. This number is less than half of what I frequently obtain, but the value of collecting depends not so much upon the number of species taken, as upon the observations which are made upon the habits of the various species.

July 3rd, 1884.

OBITUARY.

It is with a feeling of sadness that we record the death of our esteemed friend and companion, Prof. Francis Gregory Sanborn, which occurred at the residence of a friend in Providence, June 5, 1884, by an overdose of chloral, taken to allay a nervous affection, from which he was a sufferer. He was born in Andover, Mass., Jan. 18, 1838. His father, Dr. Eastman Sanborn, was born in Sanbornton, N. H., and settled as surgeon dentist in Andover.

Francis was of slender health from infancy. From a diary kept by his mother it appears that when he was two weeks old his life was despaired of for many days. He was born a naturalist, and very early developed

powers of close observation, and patient study—especially in the branch of entomology—and the common forms of life about us.

Graduating from Phillips Academy in 1858, especially did he excel in Greek and Latin—receiving his instruction directly from the Principal, Mr. Taylor—which became so useful to him in pursuing his favorite branches of Entomology and Conchology, in which he became an acknowledged expert.

He went to the State House in Boston in October, 1858, when he was employed in the State Cabinet until 1865, when he was engaged by the Boston Society of Natural History in the departments of Entomology and Ornithology, receiving the appointment as regular assistant in 1867, which position he held until 1872. In 1872 he accepted a position as teacher of Entomology and Microscopy in the Bussy Institute, connected with Harvard College. During the spring and summer of 1874 he was an assistant in the Geological Survey of Kentucky, under Prof. Shaler. With other gentlemen of the survey, he visited about fifty caves, including Mammoth Cave, chiefly with a view to ascertain the variations in temperature, and the present and extinct forms of animal life. In 1875 he was employed by the Smithsonian Institution in arranging the coleoptera of North America for the Centennial Exhibition. This collection was shown in twenty-four large cases in the Government Building. Since then he has been engaged in museum work, arranging and labelling private cabinets, giving lectures before schools and clubs, on Entomology chiefly. Until 1882 he was employed as regular custodian in the Museum of the Worcester Natural History Society, which office he held at the time of his death. His work in museums, on private cabinets, and in arranging biological collections, giving on clear and distinct labels the history of the objects, making them plain and intelligible to the people, was one of the many things in which Mr. Sanborn excelled. He studied the common things of life—those which immediately surround us—and there was rarely anything in animal or vegetable life as to which he could not gratify an intelligent curiosity, and give a correct answer, and he delighted to do so. From a notice of his death in the Worcester Spy, we quote the following :

" He was ingenious, full of resources, remarkably ready and happy in communicating information to all inquirers ; of a cheerful, buoyant and uncomplaining temper, with the simplest tastes and habits ; he was a diligent student, an agreeable and unobtrusive companion. His death seems sudden and untimely, but it is certain that he himself, unworldly as

he was, would have regarded its approach with equanimity. The Natural History Society has lost in Prof. Sanborn its most important and valued helper. His presence will long be sadly missed by visitors to the museum, and his successor, whoever he may be, will not surpass the genial and helpful custodian, who, in his own quiet and unostentatious way, has done such solid and lasting service for the cause of popular science."

A careful and painstaking student, he contributed to science services of which others reaped the benefits. Dr. Harris' work, "Insects Injurious to Vegetation," owes much of its value to the patient labors of Professor Sanborn.

He was corresponding member of several entomological societies in the States, and Life Member of the Boston Society of Natural History.

T. A. D.,
Worcester, Mass.

ON VALGUS CANALICULATUS AND SQUAMIGER: ELLESCHUS BIPUNCTATUS, XYLORYCTES SATYRUS.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Valgus canaliculatus Fab. and *V. squamiger* Beauv., have, so far as I am aware, escaped the notice of American writers on Coleeptera, except that it is mentioned in the U. S. Agricultural Report for 1868, p. 90, that *V. squamiger* was found in great numbers in January, in Maryland, under the bark and in the rotten wood of a pine stump; and that Fitch gave some account of it, under the name *seticollis*, in his report for 1857, p. 695, which I have not seen.*

* Fitch's description is as follows :—

"BRISTLY-NECKED VALGUS, *Valgus seticollis* Beauv.—Beneath the bark around the crown of the roots of ant-eaten pine stumps, feeding upon the wood, fleshy, white, thick cylindrical grubs, resembling small larvæ of the May beetle, having three pairs of legs anteriorly and the body curved into an arch, its hind part being bent more or less inward under the breast, divided by impressed transverse sutures into twelve rings; the pupæ and perfect insects also occurring in the same situations; the latter short thick beetles about 0.28 long, the males chestnut brown, beneath black, the females dull black, both sexes with chestnut colored feet, and covered more or less with little ash gray scales, flattened upon their backs, their wing covers much shorter than the abdomen and

Having been described originally in Europe, and introduced, like many others, into our Catalogues uncharacterized, collectors here have to depend on tradition for a knowledge of the species. When recent and fresh there is no trouble in distinguishing them by differences in color and the arrangement of the scales ; but with age and abrasion these disappear in many individuals, and anatomical characters have to be resorted to.

Normally, *canaliculatus* is ferruginous, and has the elytra with feebly impressed striæ, the base, middle and apex being covered so densely with whitish scales as to produce a tri-fasciate appearance. The sides of the thorax are likewise densely coated with scales similarly colored. *squamiger* is darker, slate-colored, or blackish brown. The scales are narrower and more uniformly distributed, but condensed on the centres of the disk of each elytron, so as to form a small round white spot, often obsolete. The striæ of the elytra are scarcely traceable.

It is not necessary for our purpose to relate minor anatomical differences, as there is one easy of observation that can always be relied on to separate doubtful individuals, namely, the epistoma and clypeus.

In *canaliculatus* this is short, somewhat convex, slightly channeled in the centres, with a *deep notch or depression* at the middle of the anterior margin.

In *squamiger* the same part is prominent, somewhat broadly concave, with the anterior margin *rounded.* These curious little beetles occur here abundantly on flowers from April till July, and occasionally till late in autumn. They hybernate in colonies, in crevices of standing trees in process of dry decay, where I have several times found them in large numbers.

Elleschus bipunctatus Linn. This is an introduced European species, first brought to notice by Dr. Leconte, Proc. Am. Phil. Soc., v. 17, p. 621,

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marked with rather obscure impressed lines, a broad shallow groove along the middle of their thorax, which groove is more deep anteriorly, and their anterior shanks with a row of about five little uneven teeth along their outer edge.

"In the month of April last, I met with sixteen of these beetles beneath the bark of a pine stump, slightly above the surface of the ground. The stump had been much eaten, by white ants apparently, the sap wood being all consumed and the cavity thus formed being stuffed with sand and dirt which had been carried up from the soil beneath, in which these insects were lying, torpid in their winter quarters, most of them crowded together in a heap in a single cavity in this dirt, the others scattered about in it singly, their larvæ having no doubt subsisted upon the decaying wood."—[Ed. C. E.]

without the specific characters. Detroit and Marquette are given as the places of its occurrence.

I find it here very abundantly in June on a species of small willow growing in upland thickets, and its identification I owe to the kindness of Dr. G. H. Horn. The genus in which it is placed is sufficiently defined under the name *Alyca* in the monograph of the Rhyncophora. The species is of easy recognition. It is about 2 mm. in length; the color at maturity is dark brown to black when deprived of vestiture; the elytra are finely striate, with the intervals wide and almost plane; the whole insect is densely clothed with a grayish, prostrate, scaly covering, easily rubbed off, which on the elytra is longer and hairlike. The insect takes its name from two black denuded spots on the elytra at the middle; they are shaped like a horse shoe with the convexity anterior, and are formed by two longer denuded parallel lines on the second and fourth striæ, united at the apex by a shorter one on the third. With age other spots are formed by abrasion, mostly near the base and apex, thus giving a tri-fasciate appearance. Specimens entirely nude would be difficult to determine, but fortunately for the collector, when found, the individuals are abundant.

Xyloryctes satyrus Fab. This large beetle is widely distributed, being found in Arizona, New Mexico, Texas, Kansas to Canada, and southward, and probably occurring wherever the ash and liquidambar grow. So far as known to me, but little has been written concerning it, and its life-history as given is mostly surmise. There is a wood cut of it in the U. S. Agricultural Report for 1873, with some remarks; and Mr. B. D. Walsh, Proc. Bost. Soc. Nat. Hist., v. 9, p. 287, states that the larvæ, which he briefly describes, live on the roots of grass.

In this latitude it emerges the latter part of June and beginning of July, and immediately resorts to the (white) ash, especially such as grow in open grassy places, at the roots of which it burrows, and may be taken in large numbers. The disparity between the sexes as to number is noticeable. On July 2nd fifty-five were taken at the base of a single tree, all of which were males except three. Thinking the females, as in some other species, would appear later, the same tree was again visited on the 10th, and forty-seven taken from the ground formerly dug over, thirteen being females.

Whether they eat anything is unknown, but being nocturnal, provided with well developed wings and having short, but sharp, toothed mandibles, it is probable they feed by night on the foliage of the ash. Certain it is they do not feed on the roots nor damage them in any way, and why this par-

ticular tree is selected, and for what purpose, is as yet unknown. Several times the eggs and young larvæ have been unsuccessfully sought for at the roots of the tree; and on the first of May this year a man was employed to dig at its roots; long trenches were cut in several directions, and to the depth of two feet, without finding larvæ or pupæ. The larvæ, which resemble those of Lachnosterna, but are distinguished by their "coal-black heads," as stated in the places above cited, are often found in grassy places, where I have also taken the beetle after disclosure. Now, since neither eggs, nor larvæ, nor pupæ, are found at the roots of the ash, and considering the comparative fewness of the females taken, Is it not probable that, after pairing, the latter resort to grassy places to oviposit?

At the place first cited is an extract from a letter from Mr. P. H. Foster, near Babylon, Long Island, who had a grove of over six thousand young ash trees, and from these it is stated his foreman dug up one bushel of these beetles, and that they had destroyed a number of his trees. The beetle itself is in this case certainly wrongfully accused, for it neither eats nor wounds the roots; but in case of small trees like these—"about eight feet in height"—the larvæ might have been so numerous in their vicinity as to have devoured the rootlets, by which nourishment is derived from the soil. Just what connection there is between the beetle and the ash and the liquidambar remains to be discovered, and it is to be hoped some entomologist residing in the country may be incited to a successful investigation.

Stridulation is effected in a manner I do not remember to have seen noticed, namely, by an arrangement within the acetabulum of the middle coxæ. This is very deep, and in the portion of the cavity belonging to the mesosternum is a large, polished, smooth space, divided by an acute carina; by rotating the coxæ the insect has the power at will to bring a certain part in contact with this carinated line, producing a shrill squeaking sound audible at a considerable distance. I have not succeeded in inducing them to come out of the ground to see what was going on, as narrated by your correspondent, vol. 12, p. 139.

To sum up, all that is now positively known of the life history of this bettle is, that in season it is taken burrowing at the roots of ash and liquidambar trees; that it exists in the larvæ state more than one year; and that some of its larvæ live on the roots of grass, and transform under stones, &c. All else is conjecture.

NOTES ON BUTTERFLIES, WITH DIRECTIONS FOR BREEDING THEM FROM THE EGG.

BY W. H. EDWARDS, COALBURGH, W. VA.

(Continued from page 89.)

The eggs of butterflies are very interesting objects. As a rule, those of each natural genus (I speak of the North American fauna, for I know nothing of the eggs of tropical butterflies), are closely alike, as in Pieris, Anthocharis, Colias, Terias, Callidryas; and so, while each genus has peculiarities of its own, there is a family resemblance between these genera (of the sub-family Pierinæ). They are all of one general shape, long, slender, sub-conic, or spindle-shaped, set on end, but differently ribbed according to the genus. So the eggs of Danais and Heliconia and Agraulis each have their own pattern. All Argynnis eggs, whether of the large or small species (Groups 1 and 2), are thimble-shaped. On the other hand, Euptoieta, by its egg, is allied to Argynnis, while by the chrysalis, it is allied to Melitæa. It links the two genera, and in my Catalogue of Di. Lep., I place it between these two, instead of before Argynnis, as has usually been the arrangement. So Melitæa, Phyciodes, Limenitis, Apatura, Paphia, Satyrus, Neonympha, Chionobas, may all be distinguished as readily by the eggs as by the butterflies. Lycæna, Lemonias, Thecla, Chrysophanus, so far as I know them, all show generic peculiarities in the egg stage. So does Papilio, though some of the species, as *Philenor* and *Cresphontes*, have the surface covered with a rough crust, the usual type being smooth-surfaced. Now Parnassius is ranked as belonging to the Papilionidæ and to the sub-family Papilioninæ, which includes the genus Papilio. And here alone among the American butterflies, so far as the early stages are known, is an anomaly. By the egg, Parnassius should stand near Lemonias and Lycæna, while by the chrysalis it is near the Hesperidæ or some of the Heterocera. By the caterpillar, it is widely separated from Papilio, having a resemblance to that genus in but a single character, the tentacles on second segment. So it is that I am confident that in a proper systematic arrangement of families and genera, where the preparatory stages were taken into consideration, Parnassius would stand near Lemonias.

The eggs of Hesperidæ are largely dome-shaped, either sub-conic or half a sphere; of the latter type is Ancyloxypha *Numitor*, of the former

most of the Pamphilas, and these last are usually smooth, but some, like *P. Napa*, are indented like a thimble. Of this shape also are the eggs of Megathymus and Pyrrhopyga *Araxes;* others are melon-shaped and ribbed, as Nisoniades and Eudamus, and the egg of Pamphila *Zabulon* (an abundant species of its genus), is of this type. Pholisora *Catullus* has a thimble-shaped egg, ribbed vertically and crossed horizontally by lines, while the top is curiously indented in rounded ridges. It looks much like a confectioner's jelly-mould.

Dr. Weismann, Descendence-Theory, English edition, shows that the larvae of butterflies in nearly all genera have a morphological congruence with the imagines. "The morphological congruence between larvæ and imagines declares itself most sharply in genera, where it is the rule almost without exception. In this case, we can indeed be sure that a genus or sub-genus founded on the imagines, will, in accordance with correct principles, present a corresponding difference in the larvæ," p. 444. This is just as true of the egg stage of the American species, with fully 150 of which I am acquainted. Therefore this congruence makes the study of the preparatory stages important. Until recent years, very little attention has been paid to this matter, and Dr. Weismann is the first author so far as I am aware, who has treated the larval and pupal stages philosophically. Whenever eggs are obtained they should be described from the fresh example, the form and markings noted down, and whenever possible they should be examined under a powerful microscope. By all means, if it is practicable, a drawing should be made on a greatly enlarged scale. Two or three of each species should be preserved in alcohol or glycerine for future reference. Probably glycerine is best, as eggs taken out of alcohol are apt to collapse when dry, and ribbed eggs, like those of Colias, sometimes change in shape in alcohol, expanding in diameter, with flattening of the ribs. Small glass tubes are better than narrow-necked vials for keeping examples of eggs or young larvæ. From these last it is rather difficult to remove objects.

Most eggs are green when laid, yellowish, as in Pieris, Colias, and many Papilios, bluish, as in Grapta, grayish, as in Limenitis. Lycæna has a deep green surface concealed by a white net work, but which can be peeled off. Parnassius is white, Pholisora *Catullus* is brown; the Hesperian eggs as a rule are white. Many eggs turn red a few hours after deposition, as Colias, Anthocharis. Mel. *Phaeton* turns lake-red. And all these, as well as most other species, change to black before hatching,

as the dark larva can be seen through the transparent shell. The larva eats its way through the top or side of the egg, and sometimes makes its first meal from the shell, devouring more or less of it. The larvæ which go into lethargy directly from the egg seem to eat nothing but the shell before they descend to the base of the plant and range themselves for a long sleep. In this way behave all the larvæ of the larger Argynnids, of the fall brood, when there are two broods ; so do the larger Satyrids, as *Alope*. Other larvæ hibernate after 2nd and 3rd moult, usually the 3rd, as the smaller Argynnids, *Myrina* and *Bellona*, Phyciodes, Melitæa, Apatura. Others hibernate at any stage where cold weather catches them, as Colias. Mr. Mead found hibernating larvæ of Colias under boards, in Illinois. In the arctic regions, the larvae of Colias never can reach chrysalis the same season in which the eggs are laid. Indeed, I do not see why larvæ might not be frozen for an indefinite period and come to life at last when weather was favorable. I have found that the best way to keep hibernating larvae in confinement alive through the winter months is to freeze them in the ice house, or in a snow-bank. The loss, after six months of this treatment, has been very light; whereas before I tried this method, very few and frequently no larvæ at all could be got through. They died from mould in the cellar, or from heat if in the house ; if out of doors, they moved about on warm days and perished from starvation. I have found small paper boxes excellent to keep them in, druggists' pill boxes. And these are set in a tin box and placed directly on the ice. The rough surface of the box allows good foot-hold to the larvæ, and the boxes have not moulded. I carried some 60 larvæ of M. *Phaeton* through last winter, and with them larvæ of Ap. *Flora*, all of which were half-grown, or past the third moult, with no loss to speak of. And Argynnids *Diana*, *Cybele*, Satyrus *Alope*, and other species, which hibernate direct from the egg, have been carried with trifling loss. And the later the larvæ are left on ice the healthier they seem to be. It is better to rouse them when the weather is settled and mild, than earlier, when violent changes of temperature will occur. Most larvæ pass four moults, but in case of hibernating larvæ, there is an additional moult. So that the summer brood of a species, as of Apatura, will have four, while the winter brood will have five, three before hibernating and two after it. Great care is necessary with the young caterpillars. Many species are apt to wander, and must be confined from the first, but others, as Limenitis, move very little, and may be trusted to remain always at

home, provided their food plant is kept fresh ; otherwise they certainly will wander. For convenience of observation, young Limenitis may be left on branches set in bottles of water, with no covering. So many Papilios move very little, resting in one spot for hours, but the larvæ of *Philenor* are particularly alert, and must be shut up. Most larvæ, in the younger stages, should not be touched by the finger or forceps, especially when they are near a moult. If it is necessary to change them from one leaf to another a bit of the leaf with the larvæ may be transferred, or the larvæ, if not near a moult, may be taken up by a camel's hair pencil. The habits of different species even from the moment they are hatched, are very interesting. Lyc. *Pseudargiolus* at once fixes itself on a flower bud of its food-plant, and bores a hole with its strong mandibles into the side large enough and no more to admit the head. The head is set on a long extensile neck, and the contents of the bud can be completely removed. According to Mr. W. G. Wright, the larvæ of Lyc. *Amyntula* eats into the pods of Astragalus, and lives on the young and immature seeds. The egg of Thecla *Henrici* is laid at the base of a flower stem of wild plum, and the young larva at once makes its way up the stalk and fastens on the young plum, boring into it just as the Lycaena bores into its bud, and till maturity eats nothing but the contents of plums, growing as they grow. Lemonias *Nais*, in confinement, stitched two leaves together and lined them with silk, came entirely out to feed and returned again to its nest. When about to moult, it closed the nest and was not seen for some days and till its new coat was fitted. All the species of Limenitis make perches by stripping bare the mid-rib of the leaf at the top. This would naturally curl up if left to dry, but the larva coats it with silk and stiffens it by binding on morsels of chewed leaf, and the perch remains straight. On this the larva rests the day long except when it goes to the leaf edge to feed, and feeding done it returns to the perch. This is the habit of the larva when first hatched, when its length is but one tenth inch, and the habit is kept up through the earlier stages. And connected with the perch is accumulated a little packet of scraps of leaf, just at the base of the perch, and as the substance of the leaf is eaten, the packet is rolled back so as to be kept pretty close to the cut edge. This rolling is done partly by pushing, what is gained at each effort being secured by threads, or successive threads are attached from the farther side of the packet to the edge of the leaf, and the thing is so turned over. After the second stage, that is, from 2nd moult, the packet is let alone,

and falls behind, as the perch lengthens. Now the object for which this packet is made, with all this labor, is yet unknown. These larvæ, when of the hibernating brood, in fall, make to themselves a close fitting jacket out of the leaf, snipping away here and there all superfluous parts till the pattern is cut out. Then the sides are drawn together by spun threads and held fast, and the whole interior is covered with a coating of silk. Moreover, the larva provides against the fall of its hibernaculum, by carefully weaving threads from leaf to stem and around the stem, so that the winds and storms of winter cannot possibly tear the case away. Now, the larvæ of the summer broods do not make any such cases, there being no need of them. Of all our larvæ, those of Limenitis show most of what in human beings would be called intelligence, working for a definite end, and varying their contrivances according to circumstances. Compared with them the larvæ of Argynnis, and Danais, and most other families are stupid. Paphia *Astyanax*, makes for itself a hibernaculum a good deal like that of Limenitis, but I have never had an opportunity of observing that species, and can give no description of its habits at work. Almost as intelligent as these case-makers, are some of the tent-makers, as Melitæa *Phaeton*, whose work is most finished of all its class. The eggs are laid in clusters of one hundred to three or four hundred, and the larvæ as soon as hatched knot their leaf into a nest the size of a small filbert. In course of the next two or three days they make a common web, taking in any leaf that lies convenient. As they grow they enlarge the web, all working for the common good. Especially, as each moult approaches, all wanderers come home, and the web is made tight, and into it they retire and pass the moult. Which over, the web is extended again ; and so on, till finally when the third moult approaches, the web is often as large as a man's open hand made of closely woven silk, two and three coats of it, capable of resisting storms and all the wear and tear of winter. Up to this time a few holes have been left for egress, but at last these are closed up from the inside, and the larvæ are seen no more that year or after the third moult. If at any time from the hatching the web is injured by storms, the caterpillars forthwith set at work repairing, and do not rest, whether it rains or shines, till the work is done. And they have a prevision of storms and all hands may be seen working at their dwelling industriously, strengthening it here and there, even when the sky is clear, and there appears no reason for work. The food-plant is always in swampy places, often half under water, and the webs are beaten down by snow and rain, but the inhabitants get

through safely. When spring comes and the Chelone stems begin to sprout, these larvæ come forth and return no more to their old web. They now lie exposed to view on the plant, or on stumps, chips, fallen branches, enjoying the sunshine; pass two moults, and pupate. The butterflies are sluggish, but are not caught by birds, probably having some quality obnoxious to smell or taste, and the caterpillars seem to have a similar immunity. I accidentally discovered this season that they will bear considerable drowning, having left several in a glass of water for five hours. When I came back all were lying on the bottom of the glass, and I removed them to a piece of blotting paper under a tumbler. In another hour every one of them was crawling about, and they afterwards pupated. Melitæa *Chalcedon* makes a web in which it hibernates, much like that of *Phaeton*, but by the observations of Mr. Wright, it varies the nature of it according as the species lives in the valleys or at high elevation in the mountains. And in the valleys, the caterpillars go to ground to hibernate, while in the mountains they live in the webs.

Phyciodes *Tharos* is very near Melitæa *Phaeton*, and the eggs are laid in clusters, but the larvæ do not cover themselves with a web, but lie naked on the leaves, coming together and forming clusters when the moults take place.

The eggs of Apatura *Clyton* are laid in large clusters, 200 or more, and the young larvæ are highly gregarious but are not protected by a web. After the third moult, in the summer brood, however, they separate, each one living henceforth singly, and then it draws the edges of its leaf together and forms a loose case in which it is hidden. Apatura *Celtis*, on the other hand, is nothing like so gregarious as *Clyton*. The eggs are laid in clusters of 5 to 20, so far as I have observed, though in confinement the females may lay in one bunch 50 or more. But the larvæ after third moult scatter, and hide themselves as do those of *Clyton*.

Grapta *Comma*, in the larval stage, lives singly on the under side of a hop or nettle leaf, which it draws down till it becomes like the roof of a house, affording complete shelter from rain or snow. On the edges of this roof it feeds, and when the supply fails seeks another leaf. Grapta *Satyrus* has precisely such a habit. But the allied species, G. *Interrogationis*, lies naked on the under side of a leaf, with no effort at further protection, several larvæ often on one leaf. P. *Atalanta* is solitary from the start, the egg being laid on the terminal tuft of nettle or its other food plant. The young larva at once stitches the leaf together and lies in a

close case, This is shifted frequently as the larva grows, and affords food as well as shelter. Papilio *Troilus*, when it issues from the egg, proceeds to cut a slit at the edge of the leaf and folds down a bit thereof, stitching it closely; it lines the interior with silk and on this lies concealed, going out when forced to feed. This feeding is done at the upper end of the leaf, and when the shelter gets to be insufficient, another leaf is sought and treated in same manner. P. *Palamedes* has exactly such a habit. On the other hand, P. *Turnus* lies exposed to view on the upper side of a leaf, on a bed of silk, which forms a sort of bridge as the leaf is somewhat drawn together, permitting water that falls on the leaf to pass beneath it. The larva of P. *Asterias* rests on the stem of its plant entirely unprotected. The larvæ of Colias lie extended on the leaves, on the upper sides, along the mid-ribs, well protected by the resemblance in color to the leaf they feed on, clover or Astragalus, or Amorpha.

And so each species has its larval peculiarities which repay study.

I usually confine young larvæ, particularly when careful examination of them is desired, in glass tubes, and later transfer them to half-pint jelly glasses (tin-topped). These tubes are corked tight, and the leaves will keep fresh a long time in them. But they are usually examined once in 12 or 24 hours, and the larvæ removed to fresh tubes. The date of hatching is noted on a slip of paper, also the length of the larva, and this paper is pinned to the cork. Every morning a measure of length is taken and noted down. So the moults successively, and every moult is described, and all the changes set down in a note-book. If the larvæ are in a glass, a slip of paper is held down by the cover with all particulars written on it. Sometimes the individuals of a brood are kept singly through all their stages, but most often it is only necessary to watch for the successive moults, and to note the first and last larva to moult in that particular stage. The approaching moult may always be known by the swelling of second segment, and when any larva is observed in this condition it is separated from its fellows. While moulting injuries are apt to be received, which invariably result in the death of the larva, and therefore it is best to separate the subject to prevent disturbance from other larvæ. Many larvæ are cannibalistic, and if out of regular food and hungry, will devour their next neighbor without compunction; of this sort is P. *Philenor*. As I make alcoholic examples of each species at each moult, when possible, so I save the casts of faces at each moult for future reference and study, using small homœpathic tubes for this purpose.

Larvæ bear confinement in tight glasses well, and I often receive them from correspondents as distant as Florida, or California, through the mails, in good condition. The plants keep well in this sort of confinement also. I have never used what are known as "breeding cages," which are expensive if purchased, and are troublesome to make at home. The entomologists at the Agricultural Department, Washington, have large numbers of these cages, for all order of insects. The frames are of wood, about 18 inches high by 12 wide, one side opening on hinges. All the sides and the top are filled in with fine brass wire netting ; the top fits over like the cover of a bandbox, as it is often desirable to lift it off, and the whole thing rests on a tin base, so made as to hold earth, in case it is desired to have growing plants in the cage. So larvæ of Noctuinidæ, etc., may have earth in which to bury themselves. If the sides were not of wire, but of cotton netting, many species of larvæ would eat their way out, especially when about to pupate. On a recent visit at the Department, I could not learn the cost of such cages, but should suppose three or four dollars at least would be required for them. I found that the entomologists spoken of used tubes and glasses much as I have done for the younger larval stages ; also they tie bags of guaze over growing plants in flower pots, as I often do. The bag should clear the top of the plant and leave a few inches to spare, and it is held up and spread by three sticks set in the earth. In raising the large Argynnids, *Diana*, *Cybele*, etc., violets are planted in the pots, and the larvæ do well confined by bags in the manner described. As fast as the plant is consumed another must be substituted. These larvæ make no effort to escape, rest on the earth or on the sticks, and pupate from the top of the bag. So all Satyrid larvæ are easily reared in this way. I make constant use of tin pails with tin covers, one and two quart, for many larvae. Now, as I write, I have Grapta *Comma*, Melitæa *Harrisii*, Limenitis *Disippus* (nearly mature), and P. *Philenor* feeding in pails. They do perfectly well without light or sunshine. So do Apaturas, and in fact most larvæ. The food must be changed daily and the pails washed out and dried. As for large larvae, as of the Papilios, I generally use powder kegs (wood) or nail kegs, one or the other of which can be had anywhere. Remove the top hoop, and use the second one to bind down the cotton cloth cover ; put a little earth in the bottom, and in it set a two quart glass fruit jar filled with water, in which branches of the food-plant are placed. No farther care is required than to substitute fresh branches for the old ones

as the leaves are consumed, and the larvæ will go on to pupation. This is when it is desired to get chrysalids by wholesale. So larvae may be left during several stages in bags or branches in the open, care being taken to protect them from the direct rays of the sun, or from the assaults of birds or other insects. This last may be done by a second bag outside the first, or by a screen of paper or cloth. But larvæ so treated must be brought in before they prepare for pupation, else many will eat their way out and escape.

But where observation of the larvæ is necessary, glass tubes and tumblers, and guaze-covered flower pots, and tin pails and nail kegs, will answer all the purposes of elaborate and expensive cages, and be more satisfactory, I apprehend. At any rate all my work is done in this way.

There are many northern species of butterflies, the history of which remains to be learned. Several species of Colias, *Interior*, *Occidentalis*, *Christina*, *Pelidne*; several Argynnids, all the boreal species, and most from the Rocky Mountains, also *Atlantis*, Grapta *Faunus;* and little is known of J. *Album;* the species of Erebia, Chionobas, Cœnonympha; nearly all the Lycænidæ and the Hesperidæ. I should be greatly pleased at receiving eggs or larvæ of any of the species mentioned, and would exchange larvæ of eastern species, or butterflies from any quarter for them.

ADDITIONS TO CANADIAN LISTS OF COLEOPTERA.

BY W. HAGUE HARRINGTON, OTTAWA.

(Continued from page 98.)

ANTHICIDÆ.

Corphyra terminalis Say. This is a species with reddish thorax, which, from its representation in my collection, appears to be one of the commoner species of the genus.

Anthicus fulvipes Laf. On plants in low wet localities.

cinctus Say. Rare, under bark of old saw-logs, etc.

MELOIDÆ.

Meloe n. sp.? A very small ♂ found in early spring under a stone. It differed somewhat in sculpture and puncturing from *angusticollis* and *americana*, and also apparently in the structure of the antennæ, so that Dr. LeConte thought it might perhaps be a new species.

RHIPIPHORIDÆ.

This family contains a number of species formerly included in Mordellidæ, and of some the larvæ are known to be parasitic on Hymenoptera and Orthoptera.

* *Pelecotoma flavipes* Mels. On 30th July, 1882, I captured several of these rare beetles on an old beech tree at Chelsea, Que. They were all ♂ and were exceedingly active, running upon and flying about the dead trunk, and were very difficult to capture.

RHYNCOPHORA.

The remainder of my additions are included in this great division of the Coleoptera. The difficulty in the past of determining species has so shortened the lists of the families represented in Canada, that I find a large percentage of my named species to be unrecorded.

RHYNCHITIDÆ.

Rhynchites æratus Say. One, on hickory, 12th July.

CURCULIONIDÆ.

Apion herculaneum Smith. Three or four specimens. Occurs in Penn., N. Y., D. C., Mass.

Walshii Smith. Several in July and August. This appears to be a common and widely distributed species.

segnipes Say. Not rare upon willows, especially when in flower. Habitat given as Middle and Southern States.

The above three species were named for me by Mr. John B. Smith, who has recently (Trans. Am. Ent. Soc., vol. xi., pages 41–68) revised the extensive and difficult group of the Apioninæ, and described many of the species. I have other species which, for want of time, have not yet been determined.

Dorytomus longulus Lec. Three or four specimens. July.

Grypidius equiseti Fab. Not rare. Taken on different trees.

Procas picipes Steph. Several specimens. Captured in October nearly every year on fences, etc., about the city; may perhaps feed upon potato.

Anchodemus angustatus Lec. Abundant in July on Sagittaria along the canal, feeding on the leaves of the narrow-leaved form.

Otidocephalus chevrolatii Horn. On elm, hickory, etc.

Orchestes niger Horn. A small, black hopping beetle, abundant in spring upon willows, and frequently on other plants.

subhirtus Horn. This is a pretty species, with white bands across the elytra, of which I have taken three or four upon willows when in bloom. One captured later (15th July) is slightly larger and differs in elytral markings and in color of legs.

Elleschus bipunctatus Linn. Rare on shrubbery.

Pseudomus truncatus Lec. Abundant in June on dead limbs of old butternut trees. (See CANADIAN ENTOMOLOGIST, vol. xv., p. 79.)

Acoptus suturalis Lec. On hickories in June; larvæ evidently bore in bark, and adjacent wood, of old or dead trees.

Ceutorhynchus decipiens Lec. Rare on Sagittaria in July.

Stethobaris tubulatus Say. Rare. Found in the flowers of orchids in June by Mr. Fletcher; also (by myself) in July on *Habenaria psychodes*.

Rhyncholus oregonensis Horn. Rare under bark of hardwood trees.

As a large proportion of my weevils are still undetermined, it is probable that I will be able, on some future occasion, to make further additions to our present record.

(Concluded.)

CORRESPONDENCE.

Dear Sir: I have the pleasure of informing you of a somewhat important addition to the Canadian list. When on a visit recently to my friend, Mr. Kilman, of Ridgeway, in the Co. of Welland, whilst looking over his Lepidoptera, my attention was arrested by the unusual appearance of some specimens labeled *Callosamia promethed*. As I was pondering and puzzling over them, it began to dawn upon me that it was not *promethea* I was looking at, but *angulifera*, and upon enquiring, he informed me they were his own captures in that locality.

A few years ago I was put in possession of two pairs of *angulifera* through the kindness of Mr. James Angus, of New York, the first I had seen of them. You are aware how marked the difference is between the males of the two species, the male *angulifera* bearing a strong resemblance in both form and color to the female *promethea*, with the addition of the heavy whitish angular mark in the centre of the wings, from which

I presume it obtained its name. Mr. Kilman had three specimens, two males and a female. He gave me a male, and on comparing it with the N. Y. specimens, I find it two sizes larger, and with less yellow in the general coloring. The locality where Mr. Kilman resides is particularly favorable for entomological pursuits—sandy hills and gravelly ridges, with their appropriate vegetation—marshy flats full of flowering shrubs and weeds—virgin forests with an abundance of decayed and decaying timber—belts of young second growth trees—swampy and dry ground, and long cultivated fields with their diversity of vegetable productions, all in close proximity to Lake Erie shore, whilst any and all of them are within easy reach of a few minutes' walk, making an exceedingly attractive and productive hunting ground for the collector. Mr. Kilman is working it up with considerable industry, and has secured many rare and desirable things, and when he gets them correctly identified, will be able to present a most creditable list. J. Alston Moffat, Hamilton, Ont.

Dear Sir:—Some two or three years ago I reared from the egg several hundred caterpillars of the Promethea moth. They were feeding finely upon the common lilac *(Syringa vulgaris)*, the leaves of which they ate readily. The third moult had been reached and they had attained to an inch or more in length, and there seemed every prospect of their reaching maturity, when in an evil hour an oriole discovered their whereabouts. The bird was soon joined by a companion, and the pair proceeded to kill and eat with the greatest possible avidity. Discovered in their work by persons in the house, they were several times driven off, but quickly returned with increased zest to the work of destruction. On my arrival an hour later there remained but a few of the smallest specimens, which had either been overlooked or left to grow fatter.

W. W. Hill, Albany, N. Y.

Dear Sir: *Chrysomela scalaris*—I am not able to ascertain why in Crotch's list *C. multiguttis* Hal. is accepted—is never rare in Cambridge. But this year, during May, it has been so unusually common that in certain localities a pint could be collected in a very short time on elm trees. I was told that some trees here have suffered, but I was not able to see them. At least the beetle was so exceedingly numerous that it was everywhere exciting attention of non-entomologists by the armies mounting the trunks of elm trees.

Cambridge, Mass., June 15, 1884.

The Canadian Entomologist.

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NOTES ON ANT LIONS.

BY J. ALSTON MOFFAT, HAMILTON, ONT.

One day on my late visit to Ridgeway, a party of four went on an entomological excursion by boat to a place about four miles west, called Point Abino. After taking a survey of the situation and lightening our lunch basket, we went to work. Each had his specialty; one desired beetles, another butterflies. Seeing *Myrmelion* on the wing, I turned my attention to the Ant Lions. I did not succeed in securing many of them, for although the funnel-shaped pits of the nymphs were in surprising numbers, very few of the mature insects were to be seen, it being probably a little too early for them. I captured but four specimens, one *obsoletus*, and three of what was kindly determined for me by Dr. Hagen, of Cambridge, Mass., as *Myrmelion abdominalis* Say, whose figured-gauze wings are charming objects seen through a lens. The slight acquaintance I have with them has been acquired during my visits to Ridgeway, none of them having ever been seen about Hamilton so far as I know. Mr. J. Pettit secured an *obsoletus* while he was collecting at Grimsby, but I think he never got a second, although no doubt they were there to some extent, but probably very scarce. Fine loose sand is evidently a necessity of their existence in any locality, and I would suppose comparative seclusion; both of these they have in perfection at Point Abino. I saw large patches of sand so loose that weeds could not take root upon it, and which had not been disturbed by the foot of man or beast probably for weeks, and some of these places were so occupied with their pits that it did not seem possible to get another one in without interfering with those already there. These pits were about three inches across the top, and two or two and a half deep. Their width must be in exact proportion to their depth, for the slope of the sides is just what will support the particles of loose sand. They must have their pits to make frequently during their larval existence, for every heavy shower will fill them all up. They never expose themselves to view except by accident, but lie just immediately under the

surface. The larva is provided with an apparatus for throwing up the sand, which it can do with sufficient force to scatter it for four or five inches around, and with the rapidity at times of the tick of a watch, working itself downwards as it throws off that above it, the sand flowing in as it deepens, which it jerks up again, the most of which falls outside the range of the pit; and so continues the operation until the required dimensions are obtained, when it lies perfectly still at the bottom and awaits events. An industrious ant out on a foraging expedition, in the hurry of its eager search runs over the edge of the pit. The lion at the bottom seems to be instantly aware of the fact, and begins throwing up jets of sand with great rapidity, which come showering down, frightening the ant, and it makes frantic efforts to get out; but the mere vigorously it scrambles for the top, the more rapidly it slides to the bottom, where it is at once seized. The struggle ensuing dislodges the loose sand, and a miniature avalanche pours down from all sides, which materially assists the lion to secure its victim, and the ant is soon taken out of sight. I am not aware that it has any means of enticing its prey, and as it does not go searching for it, but is entirely dependent on what happens to come in its way, I suspect it must have many a long wait between meals.

The mature insect is neither a rapid nor a graceful flier, but flaps its wings in a heavy, clumsy manner, quite different from what one would expect in so exquisitely delicate a creature. It prefers to alight in an upright position, and rests with its wings folded close to its sides.

AN ICHNEUMON PARASITE OF MAMESTRA PICTA.

BY F. B. CAULFIELD, MONTREAL.

On July 19th, 1881, a caterpillar of this moth was found on a cauliflower which had been brought from market, and was placed in a tumbler with some of the leaves. By the 21st it had shrunk considerably in size, and was greatly changed in appearance, the black and yellow markings that make this larva so conspicuous an object having faded to a dull whitish color. On the 22nd it was lying on the bottom of the glass and was revolving continuously. Under natural conditions it would, I believe, have entered the earth to go through its transformations, and the curious revolving motion might perhaps have been for the purpose of forming and smoothing its cell. On looking at it on the morning of the 23rd, a soft

white flattened ichneumon larva had issued from it, and had commenced the construction of its cocoon by spinning a few white threads. By evening it had surrounded itself with a thin egg-shaped cocoon of a yellowish white color, through which the movements of the enclosed grub could be seen. On the morning of the 24th the cocoon was finished and was dense and firm. It was of a reddish-brown color in the middle, blackish-brown at each end. The perfect insect emerged on September 13th, 1881, and proved to be *Ophion purgatus* Say. *Mamestra picta* is a well known insect, and is treated of by Harris, Riley, Lintner and others, but I do not remember seeing any account of its being attacked by a parasite.

THE PARASITISM OF EUPELMUS ALLYNII, French.

BY G. H. FRENCH, CARBONDALE, ILL.

The fact that this species is a parasite in its larval state does not seem to be questioned, but that it is a parasite on one or more species of *Isosoma* is, I understand, doubted by some entomologists. For the past two years the writer has had no doubt that such was the case; but it is possible the evidence upon which such a conclusion is based may not be generally known. For this reason a brief summary of observations may not be out of place.

That it is a parasite on *Isosoma hordei* seems evident from the following: A single joint of rye containing several galls formed by *Isosoma hordei* was put into a bottle and corked up so that no insects could get out or in. In due course of time a specimen of *E. Allynii* was found in the bottle, and the hole from which it had gnawed its way out of one of the galls was plainly to be seen. Afterward the other galls gave forth *I. hordei.* In this case there could be no question but that the specimen of *E. Allynii* came from the gall made by *I. hordei.* If no *hordei* had hatched from the other galls, this would have been evident, for the galls made by this species are too characteristic to be mistaken by any one at all familiar with their work.

I have bred quite a number of this species from the inside of the stems of wheat; and in all cases they came from the cavities inside the stalk that had been gnawed by *Isosoma tritici.* Though this species of *Isosoma* makes no gall, its manner of eating the tissue around the inside cavity is rather characteristic, so much so as to be readily recognised after

a little observation. I have found a species of grass worked in by another species of an allied insect, but the manner of work is so different as to be unmistakable. *Isosoma elymi* makes a cavity on the inside of *Elymus Canadensis* that is more nearly like that made by *I. tritici* in the wheat, but they differ somewhat.

In the fields I have found specimens of *E. Allynii* emerged from the pupa skin, but still inside the cavity of the stem; others with the hole by which they expected to emerge gnawed so that they could almost get out, and they still there with the body partly protruding, and others when they had gone, the clean cut hole indicating where they had obtained their freedom. I have bred many specimens from the straws after they had been collected, and the conditions were the same as those in the field, the inside of the stems in all cases being examined before putting them into the breeding jar.

From these facts I do not see how I could avoid the conclusion that *Eupelmus Allynii* was a parasite on the two species of *Isosoma*. I may say that my breeding jar in the case of such small insects is a jelly dish, where there is no chance for anything outside to get in.

GALERUCA XANTHOMELAENA, Schrank.

BY FREDERICK CLARKSON, NEW YORK CITY.

I visited Flushing, L. I., July 8th, to examine the insect reported to be infesting the noble old English elms which adorn the principal streets of that village. Three weeks ago these trees were in luxuriant foliage; they have now the appearance as if they had been scorched by fire. I discovered them to be attacked with a countless host of the larvae of this beetle. The American elm and other indigenous trees have thus far escaped, but it is not improbable, as this beetle is double brooded, that the numerous larvae will from the force of circumstance attack them. The eggs are laid in clusters along the veins of the leaves, on their under sides. The larvae, as soon as hatched out, begin to devour the leaves, which they render lace-like, and when full fed they do not undergo transformation by fastening themselves to the surface of the leaves, as is the habit with other species, and as I have seen recorded of this, but transform within the crevices of the bark. At this time, July 8th, the trunks of the trees are covered with the larvae seeking places to transform, and there is

scarcely a crevice of the bark but what is filled with the yellow pupal forms which will in a few days disclose the imagines. The ground immediately surrounding the base of the trees is covered with the pupae, which have been dislodged from their positions in the bark by the eager efforts of larvae crowding in the crevices to undergo transformation. As this change occurs within the crevices of the bark of trunk and limb, it becomes impossible, unless at great labor, to apply means for exterminating the pest. The evil, however, is likely to cure itself, for the larvae are so numerous, and such insatiate feeders, that starvation will probably end the visitation. Much good, however, can be done by brushing down the trunks of the trees, sweeping the ground immediately beneath, and destroying the entire mass by fire.

FURTHER REMARKS UPON THE VARIATION OF THE ELYTRAL MARKINGS IN CICINDELA SEX-GUTTATA.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

Having been away from home the greater part of the summer, I regret that I have not been able to collect some of these beautiful beetles this season, so as to further observe the interesting relation between the varieties in number, as I should like to have done. I hope, however, that some one has made observations upon them, and will favor us with an account, which would, no doubt, be very acceptable to those interested in the genus.

Since contributing the first notes upon this subject, I have noticed that Say has described two varieties of *C. sex-guttata* in his monograph of the genus Cicindela, commencing on page 415, vol. ii., of the American Entomology, edited by LeConte. The first is

"Var. *a*. Elytra each with an additional spot, which is fulvous or white, and generally inconspicuous, placed behind the middle triangularly with respect to the two anterior, marginal ones."

This additional spot is the one I have called the fourth, and var. *a* of Say therefore includes the second and third varieties given in my table (Can. Ent. xv., 208), as the description says that this fourth spot is "generally inconspicuous," implying that in occasional specimens it is conspicuous; in the second variety of my table this spot being rudimentary, while in the third it is well developed. This phrase also implies

at the same time that the specimens with the additional spot inconspicuous were of much more frequent occurrence than the others, thus proving that Say also found the second the most numerous form, as I have shown to be the case out of forty-nine specimens taken last summer, in the table just referred to. That it was more numerous than his second variety, now to be given, we shall see to be evident, as the latter was probably described from one specimen, the form being very rare.

"Var. *b*. Each elytron with a single marginal spot, the two posterior ones wanting."

This description coincides exactly with that of the two-spotted specimen taken by Mr. Harrington (whose words upon this variety I have already quoted, CAN. ENT., xv., 207). I notice that Mr. Harrington very kindly records having since found that his specimen, believed to be only two-spotted, has also rudiments of the posterior spots (CAN. ENT. xv., 239), which, however, makes it none the less interesting a form. It is not impossible that Say may have overlooked the very rudimentary dots which his var. *b* perhaps possessed, since in many cases they are perfectly indistinguishable without a glass, unless the elytra be opened and held up to the light. Though his specimen may not have had the rudiments of the same spots as Mr. Harrington's possesses, still, from the markings at once discernible upon both, the two may without impropriety be said to be the same. Speaking further of this variety, Say tells us that it was brought by Mr. Thomas Nuttall from the banks of the Missouri, above the confluence of the Platte, the region which produced many of his species of Cicindela. Thus we find that the present form has occurred in two distinct and widely separated localities: near Ottawa, Ont. (Mr. W. H. Harrington, latter part of May, 1881, CAN. ENT. xiv., 8) in the great St. Lawrence Basin; and many years before that up the banks of the Missouri, which river constitutes the western portion of the great Mississippi System. We may notice also that in each case the locality of occurrence was situated upon the opposite side from that upon which the other great river system bordered, and at about the centre of farthest removal from it. This proves without a doubt that the variations are wide-spread.

But we have yet another early record upon the subject. In Harris' Entomological Correspondence there is a letter in which Hentz wrote to Harris the following from Northampton, Jan. 1, 1826:—

"*Cicindela sexguttata* I have frequently observed, and have many accidental varieties. The color varies from a deep blue to a bright green.

I have several with the additional spot which you mention; but if you examine your specimens with care you will, I think, discern that mark, or a faint trace, in most of them."

It seems that Harris had previously called the attention of Hentz to an additional spot (probably the fourth) in this species, the above being his reply. Thus was this same variation in the elytral markings observed nearly sixty years ago by Hentz and Harris; the former leaving us to infer from his last sentence that *he also* found the variety with the rudimental fourth spot of the most frequent occurrence. Hentz also observed, as others, myself included, have done, that the ground color of the specimens varies from the typical bright green to a deep blue.

One word more as to the same peculiarity of which our subject treats having been observed in foreign species. Wood gives us some interesting information in his Insects at Home, page 16, upon the variation of the elytral markings in *C. campestris* of England. He says:—

"The color of this beautiful beetle is gold-green above, and shining copper-green below; and there are several yellowish spots on the elytra, varying much in shape, number and hue. Sometimes there are only three, but in many specimens there are six. In former times the variety in the nnmber of spots was thought to indicate that the beetles belonged to different species, but it is now decisively ascertained that they are only varieties of one single species."

Many other species of *Cicindela* are known to vary considerably in their elytral markings and coloration, some much more than others. *Cicindela* is indeed a variable genus.

NOTES ON CHRYSOMELA.

BY GEO. H. HORN, M. D.

Chrysomela scalaris Lec. The question asked by Dr. Hagen in the June number concerning the name of this insect, is more easy to answer than to arrive at a definite conclusion. Stal, in his monograph, did not recognise many of the genera into which *Chrysomela* had been divided; among them were *Doryphora* and *Leptinotarsa*. Finding that Olivier in 1807 had described a *D. scalaris*, and that Maj. LeConte in 1824 a *Chrys. scalaris*, Stal superseded the latter name by *multiguttis*. Recent authors are in accord in adopting many of the genera rejected by Stal,

and the name originally given our species becomes valid and has been adopted by Jacoby (Biol. Cent. Am., vi, pt. i., p. 197, pl. xi., fig. 6). That the name should remain in future *Calligrapha scalaris* is fortunate, since we have lately received from Arizona a specimen of *Calligrapha multiguttata* Stal (in cab. Lec.), which is well figured in the work above cited, pl. x., fig. 5.

Calligrapha opifera Stal. To this species I refer some specimens collected by Morrison in Arizona. They differ from the figure given by Jacoby (Biol. loc. cit., pl. 12, fig. 10) in having the elytral markings narrower, so that the sigmoid band does not unite with the sutural stripe. In all other respects there seems to be no difference; the markings are of the same type and occupy the same relative position.

Calligrapha labyrinthica Lec. Under this name specimens have been distributed in many cabinets, based on a name long existing in Dr. LeConte's cabinet, and which has never been published. The markings so exactly reproduce those of *C. pnirsa* Stal (Biol. loc. cit., pl. 11, fig. 18) that I have no hesitation in referring our specimens to that species. My specimens are from Canada. I have no memorandum of the locality of those in LeConte's cabinet.

Calligrapha limbaticollis Stal, should be omitted from our lists. The species was added by Crotch on the authority of several specimens marked "Chicago" in the cabinet of Dr. LeConte. On inquiry by me concerning these specimens, Dr. LeConte told me that the source from which he obtained them had proven very unreliable in other cases, and he advocated removing the above name from our lists.

Doryphora (Leptinotarsa) melanothorax Stal. A specimen collected by Prof. Snow in New Mexico is in LeConte's cabinet, and has been identified by the latter with this species. It is of the form and size of *Haldemani*, etc., head and thorax black with a slight tinge of green, the elytra vittate nearly as in *decemlineata*.

Plagiodera flosculosa Stal. A specimen of this species is in my cabinet from California. Body oval, not very convex, beneath aeneopiceous. Head piceous, front testaceous. Antennae with the five basal joints testaceous, the outer joints black. Thorax sparsely finely punctate, piceous, the apex and sides testaceous. Elytra coarsely sparsely punctate without order, yellowish, suture black, except a short distance at base, a median transverse black band, sinuous on its margins and wider exter-

nally, an oval humeral black spot, a smaller one within, a large triangular black spot, which is emarginate in front, near apex.

This species is well figured in Biol. Cent. Am., vol. vi., pt. 1, pl. x., fig. 1, with the name *aeneiventris* by mistake.

LIST OF GEOMETRIDÆ CAPTURED AT ORONO, MAINE, AND VICINITY.

BY MRS. C. H. FERNALD.

Choerodes clemitaria, A. & S.
" transversata, Drury.
Tetracis crocallata, Guen.
" lorata, Grote.
Metanema quercivoraria, Guen. Very rare.
" inatomaria, Guen. Rare.
" carnaria, Pack.
Caberodes confusaria, Hübn.
" majoraria, Guen. Rare.
Ennomos alniaria, Linn.
Eudalimia subsignaria, Hübn.
Azelina hubnerata, Guen.
Endropia serrata, Drury.
" obtusaria, Hübn. Rare.
" effectaria, Walk.
" bilinearia, Pack.
" armataria, H.-S.
" vinulentaria, G. & R. Very rare.
" marginata, Minot.
" warneri, Harvey.
" hypochraria, H.-S.
" duaria, Guen.
Epirranthis obfirmaria, Hübn.
Therina fervidaria, Hübn.
Metrocampa margaritata, Linn.
Antepione depontanata, Gr. Rare.
" sulphurata, Pack. Very rare.
Sicya macularia, Harr.
Hesperumia ochreata, Pack. Rare.
Angerona crocataria, Fab.
Nematocampa filimentaria, Guen.
Plagodis rosaria, G. & R. Very rare.
" keutzingaria, Gr. Very rare.
" fervidaria, H.-S. Very rare.
Hyperetis amicaria, H.-S.
Aplodes packardaria, Gr.
Nemoria subcroceata, Walk.
" gratata, Walk.
Eucrostis chloroleucaria, Guen.
Ephyra pendulinaria, Guen.
Acidalia inductata, Guen.
" quadrilineata, Pack.
" enucleata, Guen.
Asthena lucata, Guen. Rare.
Stegania pustularia, Guen.
Gueneria basiata, Walk. Rare.
Deilinia variolaria, Guen.

Deilinia erythemaria, Guen.
Eudeilinia herminiata, Guen.
Corycia vestaliata, Guen.
" semiclarata, Walk.
Eumacaria brunnearia, Pack.
Semiothisa bisignata, Walk.
" enotata, Guen.
" granitata, Guen.
Phasiane orillata, Walk. Rare.
" mellistrigata, Gr.
" trifasciata, Pack.
Thamnonoma wavaria, Linn.
" sulphuraria, Pack. Rare.
" brunneata, Thun. Rare.
" argillacearia, Pack.
Lozogramma lactispargata, Walk.
" detersata, Guen.
" atropunctata, Pack. Rare.
" defluata, Walk.
Eufitchia ribearia, Fitch.
Orthofidonia exornata, Walk. Rare.
Caripeta divisata, Walk. Rare.
" angustiorata, Walk. 1 ex.
Ematurga faxonii, Minot.
Fidonia truncataria, Walk.
" notataria, Walk.
Caterva catenaria, Drury.
Cleora pulchraria, Minot.
Cymatophora larvaria, Guen. Rare.
" humaria, Guen. Rare.
" pampinaria, Guen.
" crepuscularia, Tr.
Tephrosia canadaria, Guen.
" cognataria, Hübn.
" anticaria, Walk.
Paraphia subatomaria. Guen. Rare.
Biston ursarius, Walk. 1 ex.
Eubyja cognataria, Guen.
" quernaria, A. & S. 1 ex.
Hybernia tiliaria, Harris.
Anisopteryx autumnata, Pack.
Operophtera boreata, Hübn.
Heterophelps triguttaria, H.-S.
Baptria albovittata, Guen.
Lobophora geminata, Gr. Very rare.
" vernata, Pack.
" montanata, Pack.
Triphosa indubitata, Gr.
Hydria undulata, Linn.
Phibalapteryx intestinata, Guen.
Anticlea vasaliata. Guen.
Rheumaptera ruficillata, Guen.
" fluctuata, Linn. Rare.
" lacustrata, Guen.
" unangulata, Haw. Rare.
" lugubrata, Schiff.
" hastata, Linn.
Ochyria ferrugata, Linn.
" designata, Hübn.
Petrophora diversilineata, Hübn.
" testata, Linn.
" prunata, Linn. Rare.
" albolineata, Pack.
" hersiliata, Guen.
" truncata, Hufn.
Hydriomena trifasciata, Borkh.
Epirrita perlineata, Pack. Rare.
Plemyria fluviata, Hübn.
" multiferata, Walk. Rare.
Glaucopteryx cumatilis, G. & R.
Eupithecia miserulata, Grote.
" two undescribed species.

ATTACUS CINCTUS, Tepper.

BY MARY E. MURTFELDT, KIRKWOOD, MO.

A friend of mine—Mr. R. J. Mendenhall, of Minneapolis, Minn.—while travelling in Mexico last winter, collected from a tree, supposed to be the wild olive, a number of the cocoons of some large Bombycid. On his return home he kindly gave these cocoons into my keeping, with the information that he could easily have collected hundreds had he had con veniences for carrying them, as the trees on which they were found had been ruinously defoliated by the insect in its larval state. The cocoons were about the size and somewhat resembled those of *Telea polyphemus*, but were rather more elongate and were not intermixed with the chalky substance seen on the surface of the latter. They depended from the twigs by bands or cords of silk from five to seven inches long.

When I received them, about the last of March, several of the moths had already attempted to make their escape, but owing to close packing had died in the act, and all that I could determine was that the colors were similar to those of *cecropia*. The cocoons that were yet intact were placed in a large rearing cage and sprayed with water, and on the 4th of April I had the pleasure of beholding for the first time a perfect specimen of the striking and beautiful species named above. Every entomologist will understand my delight as I examined its rich coloring, the large, triangular mica-like plates with which the wings were ornamented, and the band of bright colors laterally encircling the abdomen.

In the course of the following two weeks fourteen or fifteen perfect specimens emerged, as well as some that were imperfect. They exhibited considerable variety in shade. In the majority the general color tone was a rich brown inclining to olive, others were suffused with red, while a few were of a cold gray tint.

There were more males than females, and quite singularly, the former were in nearly all cases larger than the latter. Desirous of seeing the larvæ, I used every device of which I could think to obtain fertile eggs, but without success. Many eggs were scattered about on the sides of the cage and on twigs of cherry, plum and apple to which the moths were confined, but none of them hatched. I also liberated all crippled or injured specimens on various trees where I could in a measure keep guard over them, but they refused to adapt themselves to their new environment and perished without progeny.

As soon as the first specimens were dry, I sent examples to Prof. Riley, who determined them as *Attacus cinctus* Tepper, first described and figured in the "Bulletin of the Brooklyn Entomological Society for January, 1883."

One fact in connection with these specimens struck me as singular, viz., that not one of my thirty or more pupæ were parasitized. With us so large a proportion of Bombycid pupæ, under natural conditions, are destroyed by *Ichneumonidæ* and by *Chalcis* and *Tachina* flies, that I confidently expected to get something new in this line also.

Mr. Tepper's types were collected in Southern Arizona, but he does not tell us the species of tree on which they were found. Neither was Mr. Mendenhall quite certain that he had been correctly informed concerning the Mexican tree from which he made *his* collection. Consequently the food plants and larval history of this magnificent species still remain to be investigated by some entomological explorer in southern latitudes.

CITHERONIA REGALIS, Hubner.

BY FREDERICK CLARKSON, NEW YORK CITY.

In a late number of this journal, Mr. Hamilton makes some criticisms upon an article contributed by me to the January number, having reference to the transformations of this moth. That article was prepared having regard, as a matter of course, to the climate of this locality, and as the specimens referred to were developed in the one season, the question of variation of temperature was not under consideration. That the transformation of the pupa can be furthered or delayed by atmospheric conditions, is well established; a warm room developing the imago at an earlier period than natural, and an ice-house holding it in check over one season, to be developed when restored to the climatic influence of another. My point was, from facts ascertained by rearing in confinement, with surroundings as near natural as possible, that the period of pupation, whether early or late, did not create an earlier or later development of the imago, which commonly occurred at the end of May. The history of the transformation of this moth under natural conditions, would be more satisfactory than that which results from rearing in confinement, and I regret that my town residence in winter denies me this study. That extraordinary

seasons further or hinder the advent of insects, is undoubtedly true, but as a general rule their time-table is quite as exact as the migratory birds.

I think it may be problematical as to whether the pupa remains beneath or upon the surface of the ground during the winter. My experiments, after having made the most natural provision at hand, have resulted in the pupa appearing upon or near the surface, and I would add that I find by my records that a larva obtained the previous season to that mentioned in the article already referred to, transformed in the same manner, the moth appearing on the 28th of May. My theory, in the absence of more essential data, is that the pupa of this moth, in its natural state, seeks the surface and finds security under the winter leaves. I have read with much pleasure what Mr. Hamilton writes with regard to this question, but it seems to me that the only satisfactory test, other than natural, would be in the use of soil common to the growth of the hickory, as that which is the most likely habitat of this species at this period of its history, giving to the pupa when thus conditioned the full serviee of all climatic changes. The provision as recommended by Mr. Hamilton is somewhat in agreement with what I have stated. He writes: "Take two parts of sandy loam, such as is used by plasterers, and one part of black friable soil from the woods, mix together * * and when the larva disappears cover over with a layer of moss, and then the pupa will not come to the surface." This effectually imprisons the pupa, and it becomes a matter of curious enquiry if the larva, in order to transform, could have selected a spot similarly conditioned.

ON TROGODERMA ORNATA, PHYSONOTA UNIPUNCTATA AND TANYSPHYRUS LEMNÆ.

BY JOHN HAMILTON, ALLEGHENY, PA.

Trogoderma ornata. Since the publication of the remarks in vol. 15, p. 91, more has been learned concerning this pest. That it disclosed without entering the earth was eventually made evident by several of the beetles being found in a large, close box, just emerging. Why they should disclose in a large box and not in a small one was not very obvious. At last the thought occurred that hygrometric differences in food and atmosphere might account for it. Having some of the larvæ reared in a small wooden pill box, at the usual time for pupation some of these were placed

in another box of the same size, and their food moistened. In a few days they were found to have pupated, the beetles emerging about ten days thereafter. Their companions left unmoistened in the other box never developed. This is sufficient demonstration. Their entering the ground to pupate is exceptional, and the inference that they do so normally is erroneous.

Anthrenus varius is quite innocent when compared with this pest, the larva usually staying where the parent deposits the egg. But it is quite otherwise with our *T. ornata.* The female oviposits wherever she finds a dead fly, moth, or other insect; and when the young, after hatching, have devoured this, they travel off in every direction, gliding into boxes through the minutest crevice, often effecting an entrance with their jaws. Last summer a couple of small exchange boxes containing a few beetles were wrapped in four thicknesses of paper and stowed away. Later, the paper was found to be riddled with minute holes and these larvæ were in possession. An effectual mode to keep them out of boxes is to fold some crystalized white napthaline in a paper and pin it in each box, renewing it yearly. This preventive is reliable. I have some boxes made of Red Cedar, in which there are open seams, but no museum pest ever enters them. The introduction of this insect into my premises has been traced to a lot of moths, crickets, etc., sent me from West Chester, in Eastern Pennsylvania, and last year it had so increased as to give great annoyance. Having observed its habits as above, I applied vigorous treatment early this season, which I am satisfied has resulted in its absolute annihilation. As a knowledge of the method may be of advantage to some unfortunate entomologist, the outlines are given. About the first of April I saturated some two inches of the borders of the carpets around my rooms with a solution of corrosive sublimate in alcohol—two drachms to the pint. Then, in the corners and out-of-the-way places, powder and pill boxes were placed containing dead flies, moths, and small insects. The beetles oviposited in these, avoiding altogether such as occurred on the carpet along the walls. About the first of June it was considered safe to remove the traps and consign the whole to the flames. In connection with this, all refuse material in boxes, etc., not insect proof, was destroyed, and places that alcohol would not injure received a brushing with the solution. Result—not a single larva has been observed this season.

Physonota unipunctata Say. Three years ago, in the month of July, I found a colony of these beetles on the river bank feeding on *Monarda*

fistulosa L., taking over fifty individuals. They almost wholly stripped the mint of its leaves. A few of the larvæ were feeding with them—a curious object indeed ; bright yellow, its body depressed, oblong oval, with serrate spinose margins and a long bifurcate caudex turned over its back, reaching nearly to its head. I regret a more minute description can not be given, as I neglected to take any of them at that time, and none could be found when again sought for. This species had not previously been observed here and has not been since. The whole colony was no doubt the progeny of one beetle transported from some more northren region by the Allegheny during the annual spring inundation. They were all taken on a patch of mint not two rods square, none occurring on neighboring patches. With age the elytra become too hardened to pin in the usual way. All taken were of Say's type—namely, pale above with *one* black spot on the thorax. Mr. Randall, in the Boston Jour. Nat. Hist., vol. 2, p. 30, describes a variety *(Cassida helianthi)* with *three* black spots on the thorax and with the elytra in life "blackish, irregularly spotted with white," which he found on a species of *Helianthus*. Messrs. Walsh & Riley describe another variety *(Cassida 5-punctata)* found in Northern Illinois, the food plant of which has also been discovered to be a *Helianthus*. Mr. Say mentions still another variety occurring in Mexico of a smaller size and with a transverse, arcuated, black line on the thorax behind the abbreviated one.

Thus it appears that the species as a whole is very variable as to color ornamentation. It would be interesting to learn whether the races breed true to their types, or whether like *Anomala undulata* Mels., color variations occur in the same brood. And further, whether each race has a food plant of its own. Perhaps some of your readers living where the species occurs frequently could give the desired information.

The colony that was found here must have fed on the *Monarda* of choice rather than of necessity, because three species of *Helianthus (decapetalus* L., *giganteus* L., *divaricatus* L.) grew with it and were not eaten by either larvæ or beetle.

Mr. Riley in his Second Annual Report on the Insects of Missouri, p. 59, gives a wood cut of a larva of *Ph. 5-punctata* W. & R., distended, classifying it with the me[r]digerous larvæ. The ones I saw must have been nearly mature and were all clean, their furcate tails turned forward over their backs and not loaded with stercoraceus matter and cast skins,

however it may have been with them when younger and in greater need of protection.

Tanysphyrus lemnæ Fab. This is a very small thing, being among the minutest of Rhyncophora, about .05 inch in length, though this does not detract from its interest. Its trivial name is derived from the plant on which it feeds, *Lemna (minor)*, Duckweed, the little plant that floats on stagnant waters in the summer, mantling them with green, and like the insect, common to Europe and America. Though exceedingly abundant, it does not seem to be generally known, appearing on few catalogues. It occurs in August and September, and its presence may be known by observing the little circular hole it has eaten through the centre of the Lemna frond. They stay beneath the leaf as it lies on the water, or liquid mud, and come to the upper surface when this is agitated. Such as emege from clear water are entirely black, but those from the mud appear mottled; the dorsum of the thorax and elytra from which the mud is wiped as they come forth between the contiguous edges of the fronds, is black, while the other parts are more or less gray from the dried mud. No other Rhyncophorus insect being found on this plant, this alone will suffice for its identification when found. It has very long legs, and unlike most Curculionides, the insect in death does not fold them under its body, but spreads them out on either side.

LIST OF DIPTERA TAKEN IN THE VICINITY OF MONTREAL, P. Q.

BY F. B. CAULFEILD.

Determined by Dr. S. W. Williston.

BIBIONIDÆ.

Bibio albipennis, Say. Common, end of May and beginning of June.

TIPULIDÆ.

*Bittacomorpha clavipes, Fabr. Several specimens taken in a damp meadow, June.

XYLOPHAGIDÆ.

Xylophagus rufipes, Loew. Not common, June 7, 1877.

CŒNOMYIDÆ.

Cœnomyia ferruginea, Meig., *pallida* Say. Not rare on parts of Montreal Mountain, June, 1883. I found them sitting on ferns in open

places. I did not observe them in the more heavily wooded portions.

STRATIOMYIDÆ.

Stratiomyia obesa, Loew. Not rare, on flowers.

TABANIDÆ.

Chrysops callidus, O. Sacken. Not uncommon in woods.
" fugax, O. Sacken. Common.
Therioplectes socius, O. Sacken. Rare, one ♂ taken on blossoms of an umbelliferous plant, July.
" septentrionalis? Loew.
" lasiophthalmus, Macq. May 19, 1877.
Tabanus catenatus, Walk. Rare, one specimen taken resting on a stone by the river side, Lachine, July 15, 1877.

LEPTIDÆ.

Leptis punctipennis, Say.

ASILIDÆ.

Dasyllis flavicollis, Say.
" thoracica, Fab. Not common, open woods, July.
Laphria bilineata, Walk. Rare.
" gilva, Wilstn. Rare.

BOMBILIDÆ.

Anthrax alternata, Say.
" fulviana, Say.
" sinuosa, Wied.
Bombylius fratellus, Wied. Common on the border of a birch wood, Hochelaga, May 6, 1877.

THEREVIDÆ.

Thereva candidata, Loew.

SCENOPINIDÆ.

Scenopinus fenestralis, Linn.

SYRPHIDÆ.

Chrysotoxum ventricosum, Loew. Rare.
Syrphus ribesii, Linn. Common.
Sphaerophoria cylindrica, Say.
Xanthogramma flavipes, Loew.
Rhingia nasica, Say. Not uncommon.
Volucella evecta, Walk. Not rare.
Sericomyia chrysotoxoides, Macq. Rare.
" militaris, Walk. Not common.

Eristalis Bastardi, Macq. Not uncommon.
" tenax, Linn. Common.
" transversus, Wied. Common.
" brousi, Wilstn. Common.
Helophilus similis, Macq.
Syritta pipiens, Linn. Common.
Somula decora, Macq. Rare.
Chrysochlamys dives, O. Sacken. Not common.
Spilomyia fusca, Loew. Not common, on umbelliferous flowers, July.
" quadrifasciata, Say. Common on blossoms of Solidago, Aug.
Temnostoma aequalis, Loew. Rare.
Sphecomyia vittata, Wied. Rare.

CONOPIDÆ.

Conops furcillatus, Wilstn. Rare.
Zodion fulvifrons, Say.

TACHINIDÆ.

Hystricia vivida, Harris. Common.

MUSCIDÆ.

*Musca domestica, Linn. Abundant.

CORDYLURIDÆ.

Scatophaga stercoraria, Linn. Common.

SCIOMYZIDÆ.

Tetanocera pictipes, Loew.
" plebeja, Loew.

ORTALIDÆ.

Pyrgota undata, Wied. Not rare.
Ceroxys similis, Loew.
Seoptera vibrans, Linn. Rare, one specimen taken.
Chaetopsis aenea, Wied. Rare.

TRYPETIDÆ.

Straussia longipennis, Wied. Not uncommon.
Tephritis albiceps, Loew.

PIOPHILIDÆ.

*Piophila casei, Linn. Common, bred from cheese.

DROSOPHILIDÆ.

*Drosophila ampelophila, Loew. Common.

With the exception of those marked with an *, all the species in the above list were submitted to Dr. Williston, who kindly named them. As

I only took such Diptera as chanced to come in my way while collecting Coleoptera and Lepidoptera, the list is a very incomplete one. But as it contains some species not on the Society's List, I thought it better to give it, imperfect as it is, rather than wait until further collections would enable me to extend it.

NORTH AMERICAN TORTRICIDÆ, BY LORD WALSINGHAM, M. A., F. L. S., &c.

BY C. H. FERNALD, STATE COLLEGE. ORONO, MAINE.

The above is the title of a very interesting paper which his Lordship had the kindness to send to me, and which was published in the Transactions of the Entomological Society of London for April, 1884.

This paper of 27 pages and one colored plate contains descriptions of 24 new species and one new genus *(Pseudoconchylis)*, with copious notes on others. These insects were collected by Mr. H. K. Morrison in Mexico, Arizona, Montana, Wisconsin, North Carolina and Florida, and the paper is also of value in giving the distribution of many well known species.

His Lordship calls attention to the fact that *Conchylis bimaculana* Robs. is distinct from Hübner's *Pharmacis sartana*, although placed as a synonym in my Catalogue of the Tortricidæ. I had already reached the same conclusion from material which I received from Florida, but had not published the fact.

The generic names *Bactra* and *Aphelia* are both used, inadvertently, without doubt, for I have already shown (Ent. Month. Mag. vol. 20, p. 126) that they are synonymous and only one can be used.

Lord W. speaks in his introductory remarks as follows: "The great dividing range of the Rocky Mountains exercises, as might have been expected, a very important influence upon the Micro-Lepidoptera of North America, forming a barrier over which these delicate insects are apparently unable to pass. The proportion of eastern species found on the western side of this barrier is remarkably small, although the same genera are for the most part represented more or less abundantly in both parts of the continent."

While these remarks are certainly true, it is a noticeable fact that quite a number of species have actually distributed themselves all over the country and occupy the territory on both sides of the great mountain

ranges, but they are all species, so far as I know, which are quite polyphagus, or such as have been distributed through the agency of man.

This paper, together with others which his Lordship has previously published, has done much to advance our knowledge of the North American Micro-Lepidoptera, and we sincerely hope that he may continue his very valuable work.

CORRESPONDENCE.

Dear Sir: Hickory, walnut and sweet gum have generally been given as the food plants of *Citheronia regalis*, but I have a caterpillar nearly ready to pupate which has been raised on sumach *(Rhus copallina)*. I offered it *Rhus glabra*, but it only nibbled the edges of a few leaves and finally abandoned feeding until the other species was restored. A friend, to whom I communicated these facts, also found a caterpillar of *regalis* on *R. copallina.*

WM. T. DAVIS, Tompkinsville, Staten Island, N. Y.

COCOONS ON LILAC.

Dear Sir: It would be interesting to know if the cocoons noticed on lilac by Mr. Couper were really those of *Hyperchiria io.* I always thought that the larva of *io* left its food plant when full grown and spun its cocoon beneath old leaves and rubbish on the surface of the ground. Might not *Callasamia promethea* have been the species observed by Mr. Couper? F. B. CAULFIELD, Montreal.

Dear Sir: In glancing through the June number (just received) of the ever welcome ENTOMOLOGIST, I notice that Mr. J. Alston Moffat speaks of a specimen of *Callosamia angulifera* taken at Ridgeway, Ont., as being two *sizes* larger than a specimen from New York. To me this expression is meaningless. I should be glad if Mr. Moffat would give us the measurement in inches.

H. H. LYMAN, Montreal.

No. 5 issued July 29, 1884.
No. 6 issued September 18, 1884.)

The Canadian Entomologist.

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ENTOMOLOGY FOR BEGINNERS.

PULVINARIA INNUMERABILIS, Rathvon.

BY THE EDITOR.

This insect, which has commonly been known as the Grape-vine Bark-louse, might with perhaps greater propriety be now designated the Maple-tree Bark-louse, for the reason that it has been more frequently found on maples, and inflicted more injury on these trees, than it has on grape vines. The great abundance of this insect during the past season has called general attention to it and elicited many enquiries in reference to its history and habits; indeed, in many sections of Western Ontario, as well as in the adjoining States of Michigan and New York, it has appeared in such swarms as to endanger the lives of the trees attacked. Branches have been sent to us so thickly covered with the insect in its various stages of growth that they could not be handled without crushing some of the numerous population.

The earliest description of this insect was given by Dr. S. S. Rathvon, of Lancaster, Pa., in 1854, who at that time gave the results of several years' observation on this species, which had occurred in his neighborhood on the Basswood or American Linden trees (*Tilia americana*). He found them to swarm in such countless hosts that he gave the insect the significant name of *innumerabilis*. The late Dr. Fitch next published an account of it in the Transactions of the N. Y. State Agricultural Society for 1859, since which several authors have figured and described this insect; but its life history was not fully unfolded until taken in hand by the late lamented J. D. Putnam, of Davenport, Iowa, who published in 1879, in the Report of the Davenport Academy of Sciences, a most elaborate and complete description of its life history, illustrated with two plates crowded with figures representing the various stages of development, all drawn by himself from nature. To these several publications we are mainly indebted for the facts here presented.

This bark-louse appears first in the form of a brown scale, from which, as it increases in size, there is protruded from the female scale cylindrical white filaments of a waxy nature, in which eggs are laid, and these cotton-like filaments, as new fibres are secreted, are constantly pushed further back until there protrudes a bunch about four times as large as the scale, as shown in fig. 5, which is thickly crowded with eggs. Permeating through the nest is a quantity of powdery matter which under a high magnifying power is seen to be in the form of rings. The waxen filaments are adhesive and elastic, and can be pulled out sometimes a foot or more before entirely separating. When heat is applied these fibres melt, and their waxy nature is further demonstrated by their solubility in ether and chloroform. A single nest will seldom contain less than 500 eggs, and sometimes upwards of 2,000. The female begins to lay eggs in the latter part of May, and continues laying from five to seven weeks, until she dies from exhaustion, her entire life continuing for about thirteen months. During the laying and hatching of the eggs she secretes a quantity of a sweet liquid known as honey-dew, which attracts ants, flies and other insects, and it often happens that the young lice crawl up the legs and bodies of these visitors, by whom they are thus carried to other trees.

Fig. 5.

The newly hatched, yellowish-white lice soon distribute themselves over the branches, and attaching to the succulent portions, pierce the tender bark with their sharp beaks and subsist upon the sap. They shortly become stationary, when they gradually increase in size and finally reach maturity.

The scale of the male insect is very different from the female. It is longer in proportion to its size, and there are no waxy filaments projecting from it. When fully mature the insect escapes from its scaly covering and appears as a minute, beautiful and delicately formed two-winged fly, marked with yellowish and chestnut brown, with brilliant rose-colored wings which also reflect the colors of the rainbow. These flies do not appear until August and September, and their lives in the winged state are very short, not exceeding two or three days.

Besides the Maple and the Grape, these insects are, as already stated, also found on the Linden or Basswood, and sometimes on the Elm.

Where permitted to continue their depredations undisturbed, they weaken and injure, and occasionally destroy the trees attacked. They affect chiefly the under side of the branches and twigs.

REMEDIES.

The branches of the infested trees may be vigorously rubbed with a stiff brush or broom, which will dislodge many of the insects, and then coated with a strong alkaline wash made by melting either soft or hard soap and diluting it to the consistence of paint with a strong solution of washing soda; or they may be destroyed with an emulsion of coal oil made by agitating vigorously and for a considerable time one pint of coal oil with an equal quantity of milk, until the mixture assumes a creamy appearance, when it should be diluted with about ten times its bulk of water and applied with a brush or syringe.

DESCRIPTION OF THE LARVA OF HEMARIS TENUIS, Gr.

BY PH. FISCHER, BUFFALO, N. Y.

Head light green, around which is a ring of bright fine yellow granulations. Body light green whitish at the dorsal region; a whitish subdorsal line on each side running from caudal horn to third segment, also a dorsal green line running from caudal horn to 3rd segment, where they both become indistinct. Under side and legs chocolate brown, prolegs black, with a narrow white band near base. Caudal horn thin, slightly curved forward, flanked at base with bright yellow. Stigmata on first, and from third to tenth segments, dark blue. Length about two inches. Larva finely granulated with white. It is found from middle of June to end of July. Of these, some of the earliest larvæ will, after pupating, hatch within about two weeks, (the balance staying over till next spring) which will deposit their eggs and also grow to maturity towards the latter part of September; so that the larvæ may be found almost continually from June to October. The eggs are small, round and green, and hatch in about ten days; they are found on the under side of the leaves of *Symphoricarpus*, *Lonicera* (different species), and *Triosteum perfoliatum*, its food plants. The color of the larvæ of this latter brood varies considerably, some being a reddish brown with a slight purple tint, the head sometimes being yellow like the ring around it, sometimes brown; others when young are green above and black below, with a black head; others again have the normal color and other characteristics.

PHYTONOMUS PUNCTATUS, Fabricius.

The Punctured Clover-leaf Weevil.

BY A. H. KILMAN, RIDGEWAY, ONT.

A curculio new to Canada has appeared in this locality. Prevailing east winds about Aug. 10th wafted this new clover pest to our shores. This beetle, as far as I know, has not been mentioned in the Entomologist. It was introduced from Europe little more than three years ago. Appearing on the eastern seaboard, and taking the continent in the inverse order to the movement of the Colorado Potato Beetle, it is working rapidly westward. Last year no specimens were reported west of Rochester, while in Eastern New York the clover crop was destroyed by this insect. On the date above mentioned it appeared in Buffalo in such numbers that thousands were crushed on the pavements by the feet of passers-by. Simultaneous with this was its appearance in Ridgeway. I picked them from the fences and sidewalks, and found them in the grass on my lawn. Mr. Reinecke could have gathered them by the quart along the lake shore at Buffalo, where they had stranded after being carried by the wind far out upon the water. They have the extraordinary faculty of closing their tracheæ and suspending respiration while in the water, and an hour's sunshine on the sandy beach leaves them none the worse for a good soaking.

The beetle is two-fifths of an inch long, has a stout body of a dark brown color; sides of thorax and elytra dull yellow, a central yellow line on thorax, rows of black raised points along inner half of elytra with dashes of the same muddy yellow towards the rear. Each female has a "depositing power" of from 200 to 300 eggs. She punctures the clover stem and places an egg therein, or sometimes attaches it to the surface of the stem. The larva feeds upon the leaves, which it destroys rapidly, eating only during the night and hiding in the day time.

I am of the opinion that the advance guard of this insect invasion arrived last year, and it is the main body now; and further that those now arriving will go into winter quarters and open up a lively campaign in the spring. I am led to these conclusions by the fact that many clover fields in this and adjoining counties failed this season to blossom fully, the Clover Midge getting the blame. Whatever the sequel may show, we fear

that these invaders will prove of better staying qualities than those who crossed the border in '66, and turned to the right about at Ridgeway, because Canada was not the "clover patch" they were looking for.

LIST OF SYRPHIDÆ TAKEN IN FAIRMOUNT PARK, PHILADELPHIA, PA., DURING THE SUMMER OF 1884.

BY E. L. KEEN, PHILADELPHIA, PA.

The species in the following list were taken in Fairmount Park during the past summer, and mainly during May and June, which is the best time for Syrphidæ; then there are some which only appear in the fall months. Of all families of Diptera the Syrphidæ seem to be better represented in the Park than any other families of this order, perhaps with the exception of the Dolichopodidæ. The Syrphidæ seem to prefer damp and somewhat open woods, especially a small wood that has a small rivulet running through, near the border, and where there are patches of May apple, with the sun shining through the trees on the plants. This only applies to some species, for others prefer the borders of woods, fields, etc. I never found many Syrphidæ in a hot and sandy county, for instance like New Jersey, but what it lacks in Syrphidæ it makes up with the Bombylidæ, for last summer I took about ten species of the latter family in one day, while I only took about seven species the whole summer in Fairmount Park.

The present list does not represent all the species found in the Park; it only includes the collecting of the earlier part of the summer, for during the fall months I did little or no collecting.

Paragus bicolor, Fab. Quite common during July and August.
" tibialis, Fallen. " " " "
Pipiza femoralis, Loew. Very rare; took one specimen May 3rd near a small creek.
" albipilosa, Willist., n. sp. Rare; two specimens May 15th in damp woods.
Chrysogaster nigripes, Loew (= Orthoneura ustulata, Loew). Not very common.
" nitida, Wied. All summer.

Melanostoma obscura, Say. Quite common in damp situations.
" mellinum, Linne. Very common in spring.
Platychirus hyperboreus, Staeg. Common.
" quadratus, Say. All summer in damp situations.
" peltatus, Meig. Common in spring.
" cœrulescens, Willist. Rare in spring.
Syrphus abbreviatus, Zett. May and June.
" americanus, Wied. May and June; very common.
" Lesueurii, Macq. All summer; common.
" Ribesii, Linne. Common.
" arcuatus, var. lapponicus, Zett. Rare; took a specimen on April 27th and May 3rd.
" sp. nov.
Mesograpta geminata, Say. All summer; very common.
" marginata, Say " not quite so plentiful as the above.
" polita, Say. Quite rare in comparison with the above two species.
Sphaerophoria cylindrica, Say. All summer; very plentiful during May and June.
Allograpta obliqua, Say. Quite common.
Xanthogramma emarginata (Say) Willist. Not very common.
" flavipes (Loew) Willist. Not very rare; took four specimens this year.
Ascia globosa, Walk. One specimen Aug. 25; quite rare.
Sphegina lobata, Loew. In spring, May 15 and 21, took several specimens in a damp woods; not very common.
" Keenii, Willist., s. nov. In company with S. lobata; took this species May 21; very rare.
Ocyptamus fuscipennis, Say. All summer, very common.
Baccha aurinota, Walk. Quite rare; took only one specimen in July.
" Keenii, Willist., sp. nov. Very rare; took this species in a path going through an open woods.
Rhingia nasica, Say. Very common in both sexes in woods.
Eristalis aeneus, Scop. All summer; commonest of all the species of Eristalis.
" Bastardi, Macq. Quite common during June.
" dimidiatus, Wied. Not rare; June and July.
" tenax, Linne. Very common all summer.

Eristalis transversus, Wied. All summer.
" Brousii, Willist. June: very common last year; only took two specimens this summer.
Helophilus similis, Macq. Quite common.
" latifrons, Loew. "
Pterallastes thoracicus, Loew. Not very plentiful; only two or three specimens are generally taken during a season.
Mallota posticata (Fabr.) Willist. Quite common.
" Bautias, Walk. Quite common.
Tropidia quadrata, Say. In damp and shady situations; common.
Criorrhina analis, Macq. Common in woods during May and June.
" intersistens (Walk.) Willist. Very rare; took three specimens May 23rd in a woods.
Brachypalpus frontosus, Loew. Very rare; I reared this species from a larva which I found between some loose bark on a stump of a tree.
Sericomyia limbipennis, Macq. Common in woods during spring and fall.
Xylota ejuncida, Say. Common.
" angustiventris, Loew. Not very common.
" pigra, Fab. Not very common in this locality.
Syritta pipiens, Linne. All summer; this is about the commonest of all Syrphidæ.
Somula decora, Macq. In spring and fall in woods; quite common.
Spilomyia longicornis, Loew. In September: not very plentiful.
Temnostoma alternans, Loew. In spring in woods; rare.
" bombylans. Quite common during May.
" pictulum, Willist., sp. nov. June; very rare.
Milesia ornata, Fabr. August; rare.

SYNONYMICAL NOTES.

BY GEO. H. HORN, M. D., PHILADELPHIA, PA.

LAMESIS Westw. Tijdschr. voor Entom. xxvi., p. 67. I would call attention to the possible identity of this genus and *Xenorhipis* Lec. The figure given by Westwood (pl. 3, fig. 8) certainly bears a very close

resemblance to that published by me of *Xenorhipis* (Trans. Am. Ent. Soc. 1882, pl. iv., fig. 7, 8). If the two should prove identical, the name given by LeConte (Proc. Acad. 1866, p. 384) should have priority.

L. suturalis Westw. occurs at Cordova, Argentine Republic.

Cyrtophorus gibbulus Lec. (niger ‡ *Lec.*) On examining this insect with Dr. LeConte, we were convinced that it does not differ in any respect from *Microclytus gazellula* Hald.

Leptura coccinea Lec. After refreshing my memory by a glance at the type in Mr. Ulke's cabinet, I visited the Agricultural Department and from force of habit glanced over the plates of Ratzeburg's Forst-Insecten, and I at once recognised a great similarity between my mental image of *coccinea* and *rubrotestacea*. On comparisons being made by Messrs. Ulke and Schwarz, the two were found identical. As the specimen was reported to Mr. Ulke probably in error as from California, the name should be placed as a synonym of *testacea* Linn. (= *rubrotestacea* Ill.) and dropped from our lists.

L. atrata Lec. After a careful examination of the very old unique in the cabinet of Dr. LeConte, the latter agreed with me that it was a specimen of *proxima* in which the customary black tip had extended, covering the whole elytra.

THE ASH SAW-FLY (*Selandria barda* Say).*

BY HERBERT OSBORNE, AMES, IOWA.

Allantus barda, Say. Bost. Jour. 1 (1835) 218. 7.
Selandria barda, Norton. Bost. Proc., viii., 220, 3.
" " " Proc. Ent. Soc. Phila., iii., 9, 14.
" " Cresson " " " " iv., 244, 1.
" " Norton, Trans. Am. Ent. Soc., i., 247, 4.

During the summer of 1882 a few of the ash trees on the college lawn became infested with a Saw-fly worm which for a few days threatened to be quite serious. I made a few trials of London purple on the trees most seriously infested, but before I had gained results from many trees or had completed a study of the larvæ, they suddenly disappeared. So

* Reprinted from Bulletin of the Iowa Agricultural College, from the Department of Entomology, 1884, No. 2.

far as my experiments went they showed the London Purple to be a successful remedy and as applicable to these worms as to any of the Saw-Fly group. No adults were observed, and none of the larvæ I had under my observation matured: so the matter necessarily came to a rest.

During the summer of 1883 the worms appeared in much greater numbers and distributed over many more trees. At the same time and upon the same trees with these worms I observed adult Saw-Flies that I could have little doubt were the mature worms, although I did not succeed in finding the eggs and obtaining the larvæ from them, nor have I reared them as yet from the immature stage. Their presence in large numbers at the time when newly hatched larvæ were appearing plentifully day after day, and the fact that the adult *must* be an insect of this particular kind, left little doubt as to their connection. During the present season I have observed these adults as early as April 15th, and the larvæ but little later, while the eggs from which the larvæ hatch were found deposited in the petiole of the leaf.

The adults are the *Selandria barda* of Say.* the food plant of which, so far as I can find, has never been recorded.

No account of the larva or of its work is given in any of the works that I have been able to consult, and as it seems to me of too much importance to remain unnoticed, I venture to give what I know of its history with the practical results of my study, notwithstanding the doubt that rests over some parts of its life history. The pressure of other duties at the time these worms were at work prevented me from giving them the time they certainly deserved.

LIFE HISTORY.

The eggs are deposited in rows along the sides of the petiole just beneath the outer bark, and so neatly that it is almost impossible to detect any break in the epidermis. Usually there are from six to ten on a leaf. They evidently increase much in size before hatching, pushing the bark up in a blister-like elevation, and if cut out of their covering are found to be very soft, the outer membrane exceedingly delicate and easily ruptured.

* In order to be certain that my determination of the species was correct, I sent specimens to Mr. E. T. Cresson, of Philadelphia, and he has kindly compared them with the specimens in the collection of the Am. Ent. Soc., and pronounces them identical, except a slight difference in size.

The larvae are evidently hatched within two or three days after the eggs are deposited, and are at first slender, whitish worms with black heads and thoracic legs. They crawl at once to the leaflets and appear to select the more tender ones for the commencement of their work. They grow quite rapidly and reach the first moult on the third or fourth day. Before moulting they are more whitish in color, and the head particularly loses its ordinary color. After the moult the head is jet black and glistens like a glass bead; the six thoracic legs have also the same jet black color; otherwise the larva is clear green with a slightly darker dorsal line. There

Fig. 6.—*Selandria barda* (Say). Leaf of ash showing position of eggs in petiole and work of larvæ.

are seven pairs of pro-legs or false legs along the abdomen and one pair at the tail end. The body is not hairy, neither is it slimy as in some members of this genus, but the skin is somewhat wrinkled.

The worms are mostly found adhering to the under surface of the leaves, and forming a coil, though sometimes extended, especially when feeding, and as they eat away the entire leaf, cutting away at the edges or at the holes entirely through the leaf, they obtain any poisonous substance sprinkled or dusted on the upper surface.

When young they usually keep pretty well clustered together or on the same leaf, but later scatter quite generally, the early clustering being due no doubt to the eggs being laid near together and on the same leaf. The worms moult at least three or four times before reaching maturity.

The worms leave the trees before entering the chrysalis stage, and while I have not succeeded in tracing this stage, it is reasonably certain that it is passed under ground, or at least below the surface mould. It is quite certain also that the winter is passed in the chrysalis stage.

The imago has been observed abundant from April 15th till into the month of May, and also in the month of June. Whether these are two distinct broods or simply the result of great irregularity in appearance, I cannot say. It is certainly possible, however, considering the time that the first larvæ require to attain their growth that they may pupate and issue as a second brood in the month of June. These adults are black throughout, except the upper part of the thorax, which is honey yellow or sometimes orange or reddish, the amount as well as the shade differing somewhat in different individuals. The males are more slender and shorter than the females. In some specimens the front legs are partially yellowish.

They appear to be most active during the heat of the day, and can be caught without much difficulty in the hand during cool evenings.

PARASITES.

Tachina Flies. On trees where these worms were plenty I observed numerous specimens of the friendly Tachinas, and I also found their eggs on great numbers of the worms. So numerous were they indeed that I felt that the worms could safely be left to their attention.

Ichneumon Fly. A small *Ichneumon* occurred also in pretty good numbers, and though I obtained no direct evidence of their preying upon the worms, the habits of the Ichneumons are so well known that there can be little doubt of the meaning of their presence.

The Spined Soldier Bug (Arma spinosa) was observed with the Ash worms impaled on its beak, so it can be counted upon to assist in destroying them.

REMEDIES.

London Purple. The trials I made with this substance proved that it is deadly to these insects, and where it can be used without too great

expense, it may be considered a certain remedy. On all small shade trees it can be applied as readily as to orchard trees, and even on trees of considerable height a good force pump will suffice to thoroughly sprinkle the leaves.

Hellebore is also very effective for these and other Saw-fly larvæ, but as it is no better than the preceding and much more expensive, there is no need of considering it here.

Arsenic may be used in solution like London Purple, but must be boiled to dissolve it.

REMARKS ON THE FAMILY BOMBYCIDÆ.

BY G. J. BOWLES, MONTREAL.

In the American classification of the Lepidoptera, the Bombycidæ occupy a place between the Zygænidæ and the Noctuidæ. They include a large number of genera and species, and are well represented on this continent. The principal characteristic of the family is that from which it derives its name of Bombycidæ,—or spinners.—the power the caterpillars have of producing a silken fibre, which they use in spinning a cocoon in which to pass the pupa stage of their existence. The Silk-worm moth, *Bombyx mori*, is the typical species of the family. Some genera, however, do not produce silk in any quantity. They are also remarkable as a family for the imperfectly developed mouth parts in the perfect insect. In nearly all of them the tongue is short, and in some species wanting, and the other parts of the mouth so imperfect that it is not probable the insects feed at all in the perfect state.

As the family now stands in our classification, it not only comprises genera and species of very dissimilar habits, but also includes insects of many sizes, ranging from small to very large. The largest moths in America belong to the Bombycidæ. It also includes various forms, some very low in the scale. The great majority of the larvæ live on the leaves of plants, principally of trees, but some are root feeders, and others bore even into the solid wood. There are probably no other larvæ that enjoy such a range of food plants as some of the Bombycidæ. To some species almost anything in the shape of a green leaf is acceptable and nourishing food, and they are consequently among the commonest of our moths. Others again are restricted to a single plant.

Some of our finest moths, both as regards size and beauty of form and decoration, belong to this family, while it includes many small and plainly colored insects, some of which have females which never possess wings, and never move away from the cocoons in which they have passed through the pupa state.

These facts seem to show that the Bombycidæ, as classified in America, are rather a heterogeneous collection of insects, whose claims to be included in one family are open to question. Packard, whose synopsis is the best so far published, divides it into the following sub-families: some of these, however, in Europe are given the family rank.

LITHOSIINÆ. All small moths, with the wings finely scaled, and generally day-fliers. *Lithosia*, the typical genus, is but poorly represented in Eastern America, there being only one or two species found here, while fourteen are found in England alone. The larvæ of this genus usually feed on lichens. To this sub-family belong the *Crocotas*, also *Euphanessa mendica* and *Deiopeia bella*. The caterpillars are generally a little hairy, and most of the species spin thin silken cocoons.

ARCTIIDÆ. A large and well known group. The moths are of medium size, and some of them beautifully colored, hence their common name of Tiger Moths. Caterpillars generally very hairy, and make soft cocoons, in which they interweave their hairs with silk. Their supply of the latter is not large. The principal genera are *Arctia*, *Spilosoma*, *Callimorpha*, *Hyphantria*, &c. Some of the larvæ are injurious to fruit trees.

DASYCHIRÆ. The Liparidæ of European authors. Packard restricts this sub-family to *Orgyia*, and a few other genera. The caterpillars of *Orgyia* are highly ornamented, and spin thin silken cocoons. The female moths are wingless.

COCHLIDIÆ. Cochliopodidæ of Europe. Small moths with curious slug-like larvæ, which spin cocoons almost globular in form, and of a gluey appearance, the silk being more of a gum than a fibre. This sub-family has some fourteen genera and twenty-eight species in Packard's Synopsis, but only a few of them are found in Canada.

PSYCHIDÆ. A small group of diminutive moths, not found in the Eastern States or Canada. They are closely related to the preceding sub-family.

PTILODONTES. A numerous sub-family, answering as a whole to the *Cuspidates* of Newman's British Moths, although the larvæ of some of our

species do not resemble those of the latter family. The caterpillars of the *Cuspidates* are singular in form, many of them being without anal prolegs, and others being bifid at that extremity. Very few American species have this formation, but some of them are humped, and are otherwise of uncommon shape, while others have the cuspidate habit of raising the anal extremity in the air while feeding or moving about. The sub-family includes the well known genera. *Icthyura*, *Datana*, *Notodonta*, *Cerura* and others.

Platypterycidæ. This division is included in the European family *Cuspidates*. The moths are small, and all have falcate or hooked wings. In England the caterpillars of these moths are not hairy, but are marked with colored lines and spots, and some are without anal prolegs.

Attaci. Comprises our largest and most beautiful moths, as well as those which produce the best and most plentiful supply of silk. Both moths and larvæ are well known.

Ceratocampidæ. The genera *Dryocampa*, *Hyperchiria*, *Anisota* and others belong to this sub-family of large and handsome moths. Some of the larvæ make no cocoons, but bury themselves in the earth like the Sphingidæ, and there become pupæ.

Lachneides. Includes *Gastropacha*, *Clisiocampa* and *Tolype*, moths of medium or small size, with hairy bodies. The larvæ are smooth, with few hairs, and spin slight cocoons of silken fibre.

Hepialidæ. A group of wood or root-boring moths, some of which are large and robust, others small and delicate in appearance.

A glance at the foregoing sketch will show the variety of insects we include in this family, and also the widely differing habits of the larvæ. And it is both curious and interesting to note the analogies which many of the species bear to the other divisions of the Lepidoptera, and even to the other orders of insects. In some cases the resemblance is so close that it is doubtful whether the species is rightly placed, and we might be justified in removing it to some other family of moths, perhaps a long way from the Bombycidæ. Thus in the first sub-family, the Lithosiinæ, the genus *Crambidia* very much resembles the genus *Crambus* among the Tineidæ. *Euphanessa mendica* is very like a Geometer, not only in the perfect state, but also as a larva, as stated by Mr. Saunders, who calls it a "true looper." In a classification based on larval characteristics, this moth would therefore be ranked with the Geometridæ. *Crocota ferru-*

ginosa is a well known species of this sub-family, and might also be taken for a Geometer. I have captured it flying in the sunshine, in company with *Nemoria*, a small Geometer which much resembles it in form, but is different in size and color. *Ferruginosa* does not make a cocoon, the chrysalis being found under stones, with the larval skin generally adhering to its extremity. In the sub-family Cochlidæ, one of the genera is named *Tortricidia*, from the great resemblance of the moths to those of *Tortrix*, they having narrow wings, slender bodies and filiform antennæ. The Psychidæ also contains some remarkable species. The genus *Phryganidia* has many analogies with the Phryganidæ, a group of water-flies in the Neuroptera, not only in appearance, but even in the neuration of the wings, according to Packard. A European species of this sub-family, *Psyche helix*, has been known to produce young from eggs not fertilized by the male. The larva lives in a case made of grains of sand arranged in the form of a snail shell, thus resembling the Phryganidæ in habits, as it also does in structure.

The sub-family Ptilodontes includes moths which are very easily mistaken for Noctuas. Indeed in some instances it is almost impossible to tell the difference, and, *vice versa*, there are moths classed among the Noctuidæ which, in the opinion of first-rate judges, should be ranked with this family. The first division of the Noctuas is styled the Bombyciæ or Bombycoides, from the resemblance of the insects to the Bombycidæ, not only in the perfect, but in the larva state. *Acronycta* is very like *Heterocampa* and the kindred genera in the Bombycidæ. The colors are similar and the larvæ are hairy, like those of *Arctia*. I notice in the *American Entomologist* for 1880, page 49, that these facts have engaged the attention of Mr. Butler, a high English authority, who communicated a paper to the London Entomological Society on the subject, illustrated by an exhibition of preserved larvæ from the collection of Lord Walsingham. He analyzed the genus *Acronycta*, as represented in England, with the following result: *Rumicis* and *auricoma* should be transferred to the Arctiidæ: *leporina* and *aceris* to the Liparidæ; *megacephala*, *psi*, *tridens*, *strigosa*, etc., to the Notodontidæ, leaving only *alni* and *ligustri* among the Noctuas. If the life history of our *Acronyctas* were worked up, and their larvæ all known, it would be an interesting task to trace the similarities of the species to the Bombycidæ, and might result in equally remarkable conclusions. One suggestive case might be mentioned. The larva of *Apatela* (or *Acronycta*) *Americana* is a large, woolly, yellowish caterpillar

with long slender pencils of black hairs. There is a Bombycid moth found in the Eastern States, *Apatelodes torrefacta*, whose larva, judging from Smith & Abbot's drawing, bears a striking resemblance to that of *Apatela americana*. It is also a large moth, and the two may be more closely connected than is at present admitted. One of them is placed in the Noctuidæ, the other in the Bombycidæ, with a number of genera between. The larvæ of the Noctuan genera before *Acronycta*, in their bizarre appearance, also resemble those of the Ptilodontes more than those of the Noctuidæ. Newman states that *Ichthyura (Clostera)* is closely allied to *Cymatophora*, a Noctuid genus, and should be placed near it in a natural classification.

In the small and beautiful sub-family Platypterycidæ, the moths are very like Geometers, their bodies being slender and the wings broad and finely scaled. They also rest with their wings expanded, as many Geometers do.

The last sub-family in the Bombycidæ is so different from the rest in structure, appearance and habits, that it should be separated from them and given the family rank, as in England. These insects, the Hepialidæ, are borers, the larvæ living either in the roots or the stems of plants, and although they make cocoons, these are hidden in the earth or the stem of the plant in which they have fed. In their structure the perfect insects resemble Neuroptera. The body is long and soft, the antennæ small, and the places of attachment of the fore and hind wings to the body widely separated, as in Dragon Flies and other aquatic insects. Both larva and pupa are also different in form from those of the remainder of the Bombycidæ.

The foregoing notes go far to prove that our Family Bombycidæ is at present too comprehensive. A future revision should raise a few of its subdivisions to family rank, which would make the classification more simple and more natural.

BOOK NOTICES.

Ottawa Field Naturalists' Club—Transactions No. 5 (Volume II., No. 1).

The Transactions of this active Club have just been received, and bear testimony to the value of the scientific work which is being done by our Ottawa friends. The number consists of 152 pages, is well printed

and has been carefully edited. We are glad to learn from the report of the Council that the annual membership has steadily continued to increase from the inception of the Society in 1878, and now is 128. Several valuable papers in different branches of natural history which were read during the winter of 1883-4, have been printed, among which we find a capital and very appropriate Inaugural Address from the President, Dr. H. Beaumont Small, in which the history of the Club is briefly sketched and present events of immediate interest to the Club referred to, after which the different systems of classification in the animal kingdom are treated of. There are tables given of the different systems of Linnæus, Dawson, Cuvier and Haeckel. The President states that the system taught by Principal Dawson (of McGill College) is included as he is our leading Canadian authority, and his system is a fair example of many in vogue at the present day. This is followed by "Notes on the Flora Ottawaensis," which specially refers to introduced plants. Prof. Macoun contributes a paper upon "Edible and Poisonous Fungi." This is followed by perhaps the most valuable paper of all, "A List of Ottawa Coleoptera," by our esteemed correspondent, Mr. W. Hague Harrington This list shows not only great care on the part of the author in preparing it, but remarkable diligence and assiduity in making the collection of which it is a record, all of which are available for reference. The list contains no less than 1,003 species, 110 of which are new to Canada; all of these were collected within a radius of 12 miles from the City of Ottawa, chiefly by Mr. Harrington himself. This list is remarkably free from errors, and unusual care has evidently been taken to have the nomenclature correct and all synonyms eliminated. Altogether this list forms an important addition to our entomological literature. Following this is a paper by Mr. J. B. Tyrrell upon Suctoria. This gentleman has by taking up the systematic study of these insects and the Acaridæ, already done important work in Canadian entomology. It is upon these tribes particularly that the student has difficulty in finding information. A paper upon Canadian Phosphates by Dr. G. M. Dawson will be read with interest by many. There are also papers on the Fossils from the vicinity of Ottawa, by Mr. Henri Ami; on the Sand Plains of the Ottawa, by Mr. E. Odburn; and the Deer of the Ottawa Valley, by Mr. W. P. Lett. These papers are followed by the reports from the leaders in the several branches of Geology, Botany, Conchology, Entomology, Ornithology and Zoology. The plan adopted in this Club of having the work divided up

into separate branches under leaders, who are responsible for the successful working of the department under their charge, is an excellent one, and might be copied with advantage by other similar organizations.

Seventh Yearly Report on Injurious Insects in England; by Eleanor A. Ormerod, pp. 98, 8vo., London, 1884.

It is always a pleasure to read Miss Ormerod's reports; but that for 1883, which has just come to hand, is of particular interest to all engaged in the study of injurious insects in Canada, from the fact that it treats of many of the same and closely allied species which are now attracting attention in North America by their depredations. During the past season an enormous amount of damage has been done to our crops by the Fly-maggots, or the larvæ of Diptera. Unhappily very little is known of the life histories of these insects. Miss Ormerod is one of the few who have done valuable work in this line, and she is still directing special attention to them; she asks for information and records of observations which may elucidate some of the unknown stages of their existence. A suggestive fact is drawn attention to, in the presence of the grubs of various kinds which infest root and other farm crops, being also found in manure, and thus carted on to the fields. This important discovery opens up a new sphere where valuable work may be done by Canadian economic entomologists and agriculturists. On this continent undoubtedly one of the chief causes for excessively severe attacks by insects is the abundant food supply provided by the large areas of the same crop under cultivation at one time, and our insect visitations have, from this cause, been generally more disastrous than in Europe; we have thus the advantage (perhaps somewhat doubtful) of greater opportunities for thoroughly investigating them. There is no doubt that interesting results will follow if the same insect be simultaneously examined in America and Europe, and exact notes be taken of all the different stages for subsequent comparison.

A fact which must have struck every one as peculiar is the small amount of systematic work which has been done in Europe, and particularly in England, in the study of injurious insects. With the exception of the Phylloxera in France, no investigations of any importance are recorded until the last few years. Curtis's magnificent work, "Farm Insects," is of course known to all, and until Miss Ormerod began her series of yearly reports, was the only work the farmer had to refer to, and even this from its price was inaccessible to many who needed it most.

These reports are issued annually at a very low figure (the present one being one shilling and sixpence) and are besides forwarded free to all contributors. In them is given a record of the insects which have been most noticeable during the period which each one covers, and together with a plain and easy description of each species, and figures of many, precise instructions are given as to the best remedies and the means of employing them. The talented authoress must be congratulated on the skill she has displayed in treating her subject. While scientific exactness and precision have been maintained, the different insects have been described in such a manner that any agriculturist into whose hands the reports may come will be able to recognise his insect foes with ease. The knowledge accumulated during the previous year is arranged under the heads of the different plants infested, after the same convenient plan as that followed by our worthy President in his invaluable work, "Insects Injurious to Fruits."

In the report before us we have an account of observations on insects attacking the apple and pear, the cabbage and turnip, with special mention of some *Anthomyians*, from which we also suffer, and concerning which it would appear that the attack is worst where rank, fresh farm manure is used, and that the best remedy is gas-lime. We then have carrot and celery insects, also a long account of the pests attacking cereals and grasses, of which the Crane Flies (Tipulæ) seem to have been the worst depredators, followed by the Wheat Midge *(C. tritici)* and Wire Worms (Elateridæ). Some insects which more or less attack the gooseberry, raspberry and strawberry, are treated of, and under mangold wurzel we find an account of the Beet Fly, *Anthomyia Betæ*, which has been very prevalent in Canada during the past season, attacking the leaves of the beet-root by burrowing large unsightly burrows beneath the epidermis. Under onion we find an account of another of our too well known enemies, the Onion Fly *(A. ceparum)*, and the simple remedy of keeping the bulb well covered by earthing up is recommended. The Hop Aphis, which has been the cause of very heavy expenditure in England during the past summer, is treated separately in an appendix which had been distributed sooner than the general report, so as to elicit as much information as possible at the time when it would be most useful. In addition to the above there are articles on False Wire Worms (Julidæ), which had been found injurious to beans; and on Slugs (Limacidæ), which eat everything, and lastly, there is an attack on that poor, but self-assertive scape-goat, the English Sparrow.

Although it is acknowledged by all that the quality and quantity of the agricultural produce of any country is an enormous influence affecting its prosperity as a whole, and notwithstanding that there is no cause which so materially lessens this supply as the ravages of noxious insects, yet we cannot find that the English Government has done anything to encourage or foster this or similar efforts, even though there are such vast interests at stake. It is, however, pleasing to find in the preface to the report under consideration, an account of an important experiment which has been tried at Aldersey Grammar School, situated in the heart of an agricultural district in the County of Cheshire, as to the possibility of teaching boys as much entomology as is needed for common farm use, without interfering with their other studies. This experiment has now been tried for three years, under the efficient direction of the Head Master, Mr. W. Bailey, with the co-operation of Miss Ormerod, and the results have been most satisfactory. The boys received a course of lessons on insect life, illustrated by living specimens and diagrams; they also collected and bred, so as to watch through their different stages the injurious insects of the neighborhood, and by this means soon became acquainted with the common types. "In fact, *the* great step was made; by the simple but sound method of teaching pursued, the boys had learnt to know *the crop pests* by sight, without doubt or mental worry, just as they knew *the crops* that the insects infest." J. FLETCHER.

Montreal Horticultural Society, Ninth Annual Report, pp. 154, 8vo., Montreal, 1884.

This pamphlet contains much interesting and valuable information for horticulturists. "Notes on the Trees and Shrubs of Northern Japan," by Prof. D. P. Penhallow, gives a list of the most useful trees of those islands and compares them with some of our own species, with a view to suggesting which might be successfully cultivated in Canada. A most important paper is contributed by Mr. Chas. Gibb on the Russian apples imported by the U. S. Dept. of Agriculture in 1870. Descriptions, and in many cases, good illustrations, are given of the best sorts of these valuable apples, and Mr. Gibb here supplies that authoritative information which is needed in reference to those Russian apples likely to prove suitable to our climate. "The Cultivation of the Cabbage," by Mr. R. Brodie, jr., gives the best varieties, and the best way to grow them on the Island of Montreal. In addition to these papers, there are reports from judges and from four local branches of the Society.

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SCOLYTUS RUGULOSUS IN BRANCHES OF PEAR TREES WHICH WERE KILLED BY PEAR-BLIGHT.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

During the years 1882-4, large branches of young pear trees in Cambridge, Mass., were killed by pear-blight. The next year other branches were affected and killed, and finally the whole tree succumbed. All trees had been in good and healthy condition. The branches were more or less densely covered by a Coccid, determined by Prof. J. H. Comstock as *Chionaspis furfurus* (A. Fitch), described and figured in his Report for 1880, p. 315, pl. 17, f. 1. The Professor thinks it much more probable that the branches were killed by the Scolytid (directly to be mentioned) than by the Coccids, and I believe this opinion is justified by the fact that other pear trees and apple trees near by are also covered by the same Coccid and are nevertheless in a healthy condition.

The branches were densely inhabited by a Scolytus, which Dr. G. H. Horn determined as *Scolytus rugulosus* Ratzeburg. I was able to compare the beetle with specimens from Germany, which proved to be identical. The species was first mentioned by Dr. J. L. LeConte as introduced from Europe into the U. S., Proc. Amer. Philos. Soc., vol. xvii., p. 626, No. 79. The specimens were received from Elmira, N. Y., attacking peach trees. His collection contains, besides those from Elmira, N. Y., several specimens from Hillsboro, Md. Prof. Chas. V Riley informs me that he has ready for publication an extended article, with illustrations, upon *S. rugulosus*, and drew my attention to his note in the N. Amer. Entom., 1880, vol. iii., p. 298. The beetles were sent by Mr. J. L. Bennet, Red Bank, N. J. They had for several years destroyed all cherry, peach and plum trees set out on a particular lot at Fair Haven. They did not appear to injure seed fruit as yet, and are confined to a small section. They bore little holes in the trees, which holes fill with gum, and the tree soon dies. Mr. H. Boyè, Coopersburg, Pa., communicated that the same beetle had so profusely stung a young cherry tree, trunk and branches, that it will not recover. Prof. Riley has received it from Hills-

boro, Md., and from Williamsport, Md , where it attacked the peach, and from the District of Columbia. As far as known to me, the N. American literature contains nothing more concerning this beetle.

In Europe the beetle is first quoted by F. Sturm (Catalog. meiner Insecten Sammlung, 1826, p. 194), with the manuscript name, *Scolytus haemorrhous* Megerle. In V. Kollar (Naturgeschichte der schaedl. Insecten, 1837, p. 270, and English transl. p. 263) the co-editor, J. Schmidberger, gives about the best account in existence of the beetle and its habits, with the same name, *S. haemorrhous*. Professor Ratzeburg, 1837, Forstinsecten, vol. i., p. 187, and Ed. ii., 1839, p. 230, gives in a note a description with the name *Eccoptogaster rugulosus* Koch, and quotes as synonym, *Scolytus haemorrhous* Ulrich. A good figure of the beetle is given pl. x., f. 10, and of the craddle and galleries in the bark, pl. 17, f. 4. The name Ulrich is explained by Schmidberger's statement that the beetle had been determined for him by Mr. Ulrich as *S. haemorrhous* Megerle, and the article begins with this full name of the beetle. The name Koch, used by Ratzeburg, is a manuscript name. Mr. Koch, probably a student of the Professor, has nothing published. Nevertheless the beetle has been often quoted as *S. rugulosus* Koch, and only in later years as *S. rugulosus* Ratzeb. I do not understand why Ratzeburg has not adopted Schmidberger's name. That he has known this publication (though of the same year) is proved by the quotation of Ulrich's name. I am not able to see Schmidberger's work (Beitraege zur Obstbaumzucht und zur Naturgeschichte der—schaedlichen Insecten, 1827 to 1836), which probably contains the same statements as in 1837. The description by Ratzeburg without the figures would not allow a surer determination than those of Schmidberger, who gives besides a full history of the life and habits of the beetle. During the following time the literature on *S. rugulosus* is large. I have compared Noerdlinger, Letzner, Chapnis, Eichoff, Chapmann, Schmidt-goebel, for the observations on its habits. It attacks the branches, and often mere twigs, of living trees belonging to the genera *Pyrus* and *Prunus*, in great numbers, so that the infested part of the tree must perish, because it cannot continue to grow with injured bark and strongly pierced sap-wood. It appears to multiply very fast, and a double brood is supposed to occur. A few females laid so many eggs that the larvæ produced from them destroyed the bark of the stem, nearly a foot long. They cannot easily be eradicated, or at least diminished in numbers, but by removing and burning the trees attacked by them.

As I believe it to be unfair to anticipate knowingly a communication which is near its publication, I would only give a short notice of some facts which may perhaps serve Prof. Riley in bringing to the front, at least for the cases observed by me, the connection of pear-blight with this beetle. The twigs were attacked about two feet above their origin out of the trunk, where they are about two inches thick, and higher up to half an inch thickness. The next year, if the dead branch is not removed, the beetle goes further down. The craddle is perpendicular in most cases, except where it begins just below the base of a bud, and is about an inch long. The galleries are to four inches long, and rather deeply injuring the sap-wood. The hole for the pupa goes deeply, to 4 millim., in the wood. I have observed the beetle only in pear trees, but I possess it from Europe on *Prunus domestica*.

I know Mr. F. J. Burrill's papers in Proc. A. Ass. 1880, p. 583, and Amer. Nat. 1881, vol. xv., p. 527. I failed in trying to repeat his observations, what I consider of no importance against Mr. Burrill's conclusions, as just such observations need a trained skill not at my command. But I know that other scientists perfectly trained for such observations have also failed. As bacteria are everywhere to be found, we will have to wait for other reaffirming observations before we are able to accept Mr. Burrill's views. I should add that I am acquainted with the older literature on pear-blight, and with the different hypotheses about its causes.

HISTORY OF THE PREPARATORY STAGES OF PHYCIODES PICTA, Edw.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Sub-conic, truncated, the top convex, the upper part from one fourth to one third the length marked by low vertical ribs, about 24 in number; below these the surface is shallowly and irregularly indented; top similarly indented, convex; color when laid yellow green. Duration of this stage about five days.

YOUNG LARVA.—Length .04 inch at 12 hours from egg, cylindrical, each segment a little rounded; color yellow-green; a few long black hairs spring from minute black tubercles; these are in longitudinal rows, two being dorsal, and two sub-dorsal (one on either side); these rows run

from 5 to 13 inclusive, the dorsals placed on the front of each segment, the sub-dorsals on the posterior part, and all are turned forward exeept on 11, 12, 13; between these rows on either side from 4 to 12 is a very short hair on the posterior end of each segment; the number and arrangement of hairs on 2 to 4 is different from that of the succeeding segments; 2 has a chitinous dorsal patch, long oval, on the front of which are six long hairs bent over the head, and on the rear are four straight short hairs turned back; below are four short hairs to foot, one above, one below spiracle in vertical line, and two near together before the spiracle; 3, 4, 12 have each a straight cross line of long hairs, four on either side the dorsal line and down to middle of side, part of these being in the dorsal rows before spoken of; below spiracles on 5 to 12 are two short hairs to each segment, the posterior one always a little higher than the other; and a row of short hairs along base, one to each segment from 2 to 13; head sub-globose, rather broader than high, slightly depressed at top, the vertices rounded; color black, smooth; with a few short fine hairs. To first moult about five days.

After First Moult.—Length .13 inch at 12 hours from moult; color all dull yellow-green, with a brown band on upper part of side from 2 to 12; armed with longitudinal rows of spines, of which seven are large, one dorsal and three on either side, besides a row along base of much smaller size—in all nine rows; these spines are concolored with the body, long, slender, tapering, thickly beset with short hairs, the whole forming a dense covering; on 2 is a chitinous dorsal patch from which spring many black hairs, the front ones long and falling over the head; under side, feet and legs yellow green; head obovoid, the top considerably depressed, the vertices rounded; color black, smooth, with many black hairs. Duration of this stage three days.

After Second Moult.—Length .18 inch at 12 hours; color yellow-green; a faint brown line runs with the dorsal, and another just inside each sub-dorsal row of spines; a dark brown band on upper part of side from 2 to 12, and on this the tubercles and spines are brown; all others greenish-yellow; head as before. To next moult five and six days.

After Third Moult.—Length .24 inch at 12 hours from moult; scarcely different from last stage described; the brown lines on dorsum more distinct; the black band as before, as are all tubercles and spines. To next moult five days.

After Fourth Moult.—Length .36 inch at 12 hours; color in June dark brown, dotted with sordid white on dorsum; in October more white on dorsum than brown, the white sordid, the brown restricted to lines or narrow stripes, one of which runs with the dorsal spines, and one just inside the base of each upper lateral row; in both a whitish stripe runs with the upper laterals, and next under that is a broad dark brown band, in the summer larva, darker or more blackish than the dorsal color; under this band, in June, is a broad brown space much dotted and mottled with whitish, and next a basal whitish stripe; in the October larva the lower part of side is sordid white, mottled with pale brown to the yellow-white basal stripe; the June larva is more brown than white, the October larva more white than brown. To next moult in June about nine days, in October thirteen days.

After Fifth Moult.—Length in July .42 inch at 12 hours; as in previous stage in same month, except that the side below the dark brown band is lighter, more white, less brown.

MATURE LARVA.—Length .6 inch; cylindrical, even, armed with seven principal rows of short stout tapering spines, one dorsal, three lateral; the five uppermost rows thickly beset with short stiff brown hairs; the lower row with fewer, and these are yellowish; besides these is a row of small, similar spines over feet and along base; in June the spines are light brown, or yellow-brown in the five uppermost rows, the others yellowish; in October the spines of all the rows are yellow-green, from yellow bases; color of dorsum in June brown dotted with whitish; a narrow whitish stripe runs with the upper lateral spines; next under this and extending to the lower edge of middle lateral row is a dark brown band, a little dotted with whitish, from this to the whitish basal stripe the side is pale brown, dotted and mottled with whitish; in October the dorsum is yellow-white, with three pale brown stripes, one mid-dorsal, one just inside each upper lateral row of spines; the band as in June, but chocolate-brown; the lower part of side nearly white, the two or three anterior segments mottled with pale brown; on 2 is a black chitinous dorsal oval patch, from the front of which black hairs bend over top of head; under side, in June, greenish-brown, in October, yellow-green; feet and pro-legs concolored with under side; head cordate, the vertices rounded, shining dark brown; most examples have a yellowish bar on each vertex from back to front; in some this is partly or altogether want-

ing ; surface much covered with long bent black hairs. From last moult to pupation nine days.

CHRYSALIS.—Length .36 to .4 inch ; shape of P. *Tharos ;* abdomen swollen, anterior parts narrow ; head case transversely compressed, the top rounded, corners rounded, sides excavated ; mesonotum rounded, not carinated, rather prominent, followed by a shallow depression ; the wing cases slightly raised at margins ; color uniform yellow-brown ; or the wing cases, head and mesonotum are yellow-brown, a dark brown patch on either side of mesonotum toward the front ; the abdomen mostly dark brown, mottled a little with yellow-brown ; two yellow-brown sub-dorsal stripes from the length of the abdomen, and two others sub-vertical ; no tubercles apparent ; surface granulated. Duration of this stage about seven days.

This pretty species flies in Colorado, abundantly in the southern part ; also in New Mexico and Arizona, and more or less in Nebraska. Mr. Nash obtained eggs by confining the female on Aster and also on Alfalfa. They are laid in clusters, as with the other species of this genus. I received from Mr. Nash, at Pueblo, So. Colorado, two clusters of eggs, 11th June, 1884. They began to hatch a few hours after arrival. There were about 75 eggs, in some parts three deep. On 18th came another lot of larvæ just hatched. I gave them leaves of various species of Aster. In all respects their behavior was like that of *Tharos*, and they are as hardy and as easy to rear. The first chrysalis formed 9th July, and the butterfly came from it 15th July. On 21st August I received from Mr. Nash another lot of larvæ just hatched. These passed first moult 27th, the second 30th, the third 4th Sept.; after this they eat little and I supposed would hibernate ; but one passed 4th moult 27th Sept., and the rest passed same before 4th Oct. One passed the 5th moult 11th Oct. Up to this time the weather had been warm, but on 16th to 18th Oct. the nights were cold, nearly at frost, and the larvæ went into lethargy. These fall larvæ differ considerably in color from those of mid-summer, being lighter, less brown, as I have set forth in the description. On 6th June, 1884, I received one larva from Mr. Nash, which must have hibernated. It was .4 inch long, and past third moult. On 15th passed fourth moult, and 25th passed fifth moult, but died without disclosure of imago. There would seem to be two annual broods of the species at Pueblo. The female of *Picta* was described as *Canace*, Tr. A. E. Soc. 3, 206, from Arizona. The male described was taken in Nebraska by the late Mr.

James Ridings in 1864 (Proc. Ent. Soc. Phil. 4, 201). The female is larger than the male and much more inscribed on under side. This species does not seem to be seasonably dimorphic, as are *Camillus* and *Tharos*, but the early and late examples are of the same pattern of marking.

ON THE COURTSHIP OF THE SEXES IN ŒDIPODA CAROLINA.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

For several seasons past, along in the latter part of summer (August and September) I have noticed certain peculiar actions on the part of the large flying locust, *Œdipoda carolina* Linn. I have always suspected that these actions have something to do with the union of the sexes. In the warm parts of the days at this time of the year individuals of this species may frequently be seen rising from the ground, and, hovering several feet in the air, rapidly vibrating their wings and making a peculiar flapping or beating sound, the while keeping nearly the same relative position in space. Although my notes on this subject are rather imperfect, I think they may be of use. I can not find that the subject has ever been touched upon before; such may be the case, but I have not been able to discover record of it in any reports, periodicals or works on insects. Still these actions must have been noticed by observers, as they are of common occurrence.

On the 14th of August last, in the afternoon, I saw one of this species fly up from the dry parched grass, and remain nearly stationary about two feet in the air for some time, by means of a rapid beating of the wings. Presently it flew back to the ground. In a few minutes another one, which had witnessed the performance at a short distance, flew quickly over and alighted by the side of the performer. They ran by each other several times, occasionally touching each other, but did not make any further manifestations, and finally the last one flew away, leaving the other motionless in the withered grass. Though it is probable that the females are attracted by these performances of the males, and that the males vie with each other in their exhibitions, still I think that the two just spoken of were both males and were disposed to fight from a feeling of rivalry, the one that flew off having been beaten. On the 24th of the month I noticed

the same thing over again. An individual performed three times in succession, and then another alighted on the ground by its side; they ran by each other several times, apparently clasping, probably in conflict, for I am quite sure they were both males. At last one of them flew away, and the other soon after renewed the performing. I regret to say that I did not capture specimens to ascertain the sex; but, judging from size, I do not think I have ever seen any but the males taking active part in these aerial exhibitions. In going through with the performance they rise at first generally about three or four feet, making a light purring or beating sound, and then, rising higher, change the motion of the wings, when a curious, sharp, see-sawing sound is produced. Some rise even higher than six feet in the last act; others rise only one or two feet. Of course some excel others in the beauty and ease with which they accomplish the feat; many do not remain in just the same place while hovering, but vary, falling or jerking about while endeavoring to keep the same point in the air. I am of the opinion that the females are sensitive to the grace with which this is performed.

THE CROTON BUG IN QUEBEC PROVINCE.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

One morning last November I went to the Chaudiere Curve, to meet the train from Halifax, which had been delayed for some hours. I found two men in the waiting-room who had spent the night there. They complained that swarms of black beetles had troubled them all night so that they could not sleep. Upon my questioning the correctness of the statement, they said, "Well, here they are in all the cracks," and they forthwith commenced to poke the creatures out. The insects were numerous enough, but they were not beetles, nor were they black. They were specimens of the German Cockroach, *Ectobia Germanica*. I afterwards enquired of one of the railway employes as to the time of the first appearance of the insects. The man told me that he first noticed them in 1882. I asked if they had appeared anywhere else in the neighborhood. "Yes," he answered, "in my own house last winter; but," he added, "I am not there in the day time, so I left the windows open and froze them out."

The enquiry is interesting, How did *Ectobia Germanica* get to the Chaudiere? At that place, which is nine miles from Point Levi,

luggage is transferred from the Grand Trunk to the Intercolonial, and *vice versa;* and the creatures might have been brought by American tourists from Boston (where it abounds), or by immigrants from Germany, or other parts of Europe. The latter supposition is the more likely, inasmuch as the immigrants far exceed the tourists in number, and also are of a different class—a class less likely to be careful as to their properties and equipments. No doubt the "bug" was carried to Boston by immigrants. It is not a "Yankee invention."

MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Pursuant to notice, the members of the Entomological Club of the A. A. A. S. met at 2.30 p. m., September 3, 1884, at the Hotel Lafayette, in Philadelphia. Present: Herbert Osborn, Ames, Iowa; Dr. John G. Morris, Baltimore; Dr. G. H. Horn, Dr. Henry McCook, Eugene M. Aaron, E. T. Cresson, Philadelphia, Pa.; C. H. Fernald, Orono, Maine; Rev. G. D. Hulst, John B. Smith, E. L. Graef, Brooklyn, N. Y.; C. V. Riley, B. P. Mann, Washington; J. H. Emerton, G. Dimmock, Cambridge, Mass.; L. M. Underwood, Mr. Larkin, Syracuse, N. Y.; Dr. P. R. Hoy, Racine, Wis.; Wm. Saunders, London, Ontario; J. A. Lintner, Albany, N. Y.; Dr. Maclosky, Princeton; Dr. Harte Merriam, Locust Grove, N. Y.; H. H. Lyman, G. J. Bowles, Montreal; Prof. Martin, Messrs. Moore, Hunt, Casey, Wenzell, and others.

In the absence of the President, D. S. Kellicott, of Buffalo, N. Y., the Vice-President, Herbert Osborn, was called to the chair. A letter was read from Mr. Kellicott, regretting his inability to attend.

The election of officers was then proceeded with, and resulted as follows:—

President.....Dr. John G. Morris.
Vice-President.....Herbert Osborn.
Secretary.....John B. Smith.

Dr. G. H. Horn made some remarks on the historic associations connected with the spot where the present meeting was held. Many years ago when this site was far out of the City of Philadelphia, the Museum of

Natural History was there erected, and in the corner occupied by Parlor C of the hotel, stood the skeletons of a horse, ox or other large mammal. Here Thomas Say, poor in pocket, though rich in brain, having no other place to go, put up his bed under these skeletons, and that for many months was his only home; there also he contracted the illness which eventually caused his death.

The Secretary then read a short paper by D. S. Kellicott, as follows:

A NOTE: OVIPOSITING APPARATUS OF NONAGRIA SUBCARNEA.

At the Minneapolis meeting of this Club, I read a note on the life history of this species, the substance of which, together with a brief description of the moth, has since appeared in the *American Naturalist*. Since then I have ascertained how the eggs are placed and protected through the winter, and have examined somewhat the structure of the egg-placing apparatus. I have submitted an account of this moth to the Publication Committee of the Buffalo Society of Natural Sciences, from which I am permitted to extract the following remarks. I enclose also a tin-type of the drawings accompanying the paper mentioned, together with a fragment of a *Typha* leaf with the edges rolled over rows of eggs.

Figure 2 represents the ovipositing apparatus as seen from one side and below. Explanation is scarcely necessary. The last two abdominal joints are strangely modified, constituting a complex apparatus. The last joint is laterally broad, chitinous, except at base, terminating in two finger-like processes *(c)*; these are rounded at the apices and curved downwards as represented in the drawing; at *b* are two concave discs with a deep groove *(g)* leading up to the anal orifice; it is evidently along this channel that the eggs are passed by the ovipositor; on either side and below the groove there is a strong chitinous ridge with saw-like teeth pointed backward *(e)*. The other modified ring consists of a heavy hard band *(a)* with stout posterior processes for muscular attachment; below are two stout chisels *(d)* pointing backward and overlapping the first basal teeth of the "saws" of the last ring.

I have not succeeded in witnessing the act of oviposition. Numerous females were kept in an abandoned aquarium with *Typha* leaves, and the same watched faithfully; it was approached by day and by night, but all were concealed and quiet whenever observed. Day by day I could find additions to the stock of eggs, but the manner of performing the delicate operation of folding over and cementing down the leaf edge, forming a

secure tube for the eggs, I was not permitted to see. The eggs laid in September remained unhatched in the tubes until spring.

Fig. 3 of the tin-type represents the remarkable frontal "spine" of the moth, by means of which it rips open the pupa cell in the stem of the *Typha* and escapes. Fig. 4 represents the same of *N. typhæ*, and fig. 5 that of *N. subflava*. That of the last is hardly bilobed; under an inch objective, however, the apical notch appears. Only one examined.

The tin-type showing the structural details was examined by the members.

Mr. J. B. Smith said that the clypeal modification referred to was not peculiar to this species, but was shared by all others of the same genus. Clypeal modifications were very common throughout the Noctuidæ; indeed almost universal in species living in the stems of plants where the insect had obstructions to overcome in emerging from the pupa.

Mr. Smith exhibited six large photographic plates of *Agrotis*, illustrating a large number of species, and made some remarks on the great structural variability of the group *Agrotis*. Fully 26 groups based mostly on structural characters were indicated. Spinulation of tibiæ, structure of front, vestiture, form of wings, antennal structure and general habitus, all are variable, and so gradual are the gradations that generic types can not be well founded on them. The plates were examined by the members, and it was agreed that they were fine specimens of the photographer's art as applied to this branch.

Dr. Morris asked whether the tendency had not been of late to an unnecessary increase of genera in all orders.

Mr. Smith said that as to the Noctuidæ undoubtedly genera were based upon apparently insufficient characters, but less so than in Coleoptera.

Dr. Horn said it was a principle long since laid down by Lacordaire that characters scarcely of specific value in one group formed excellent bases of even higher divisions in others; in his view genera are established for convenience merely and have no existence in nature. Nature has only species, and genera were simply useful in dividing the mass of species to facilitate recognition. However, of late, as new material was becoming more scarce, persons seized with the *mihi* itch were taking to describing genera; for some 12,000 species of N. A. Coleoptera, fully 2,000 genera were described.

Dr. McCook said that in ants and spiders there is plenty of opportunity for persons afflicted with that itch, as there was a very large un-

worked field there, and plenty of new forms. About 200 species (American) are thus far described. Of spiders a somewhat larger number.

Mr. Emerton said there were some 400 described species, and that naturalists generally had no idea what a very great variety of spiders really existed.

Mr. Mann read a letter from O. S. Westcott, of Maywood, Ill., suggesting the formation of a stock company for the purpose of publishing an American entomological journal, and after a lengthy discussion the question was referred to a special committee consisting of Messrs. Mann, Osborn, Horn, Aaron and Smith.

Prof. Fernald presented an invitation from the Agassiz Association, received by him, inviting the members to be present at a lecture by Dr. McCook, in Franklin Institute this evening. This invitation was accepted by the Club.

Prof. Fernald then asked for the opinions of the members on the following points :—

1. Where a name has once been published by an author, shall we change the mode of spelling to one more consistent with the derivation? e. g., Treitschke, Schmet. viii., established the genus *Cochylitis*. Shall we adopt his spelling, or the more correct *Conchylis*?

Dr. Horn said he would not change it; that generic names are mere aggregations of letters representing a living thing, and that at least one well known entomologist habitually formed generic names by coining words without any meaning whatever, merely with a Grecian sound, and generally euphonious. If such names were accepted, so should misspelled names be. Some purists would make every name correspond with its origin, and it had been proposed to change the well known and universally accepted term, *Bembidium*, into *Bembicidium;* this was displaying learning without adding to knowledge.

Mr. Mann agreed with Dr. Horn. Dr. McCook thought a manifest error might be corrected, but would not make the correction if thereby an author's right of priority were destroyed, i. e., if the name thus changed were pre-occupied at the time it was originally proposed.

2. When an author once publishes a name which is manifestly incorrect in orthography, and in a later work corrects his own error, shall we adopt his correction? e. g., Treitschke published the genus *Pendina*, but later corrects it to *Penthina*.

Dr. Horn thought that where the derivation of a name was stated, a manifest error might be corrected by the author, but it would depend somewhat upon how general the use of the name had become; he was inclined to adhere to the name as originally written.

Mr. Mann also thought it would depend upon how much the name had entered into use. If it had not become known or used as erroneously written, and the author's correction was made in a reasonable time, it should be adopted.

3. Should the termination of the specific name be made to agree with the generic in gender? e. g., Zeller and some others write *Tortrix viridana*, *Exartema permundanum*, and *Lophoderus ministranus*. Shall this rule be adopted, or shall we adopt the ending *ana* irrespective of the gender of the genus?

Dr. Horn said that in Coleoptera the rule was that specific and generic names should agree in gender, and he thought the rule should be universal. Where, however, a termination had some special signification, where it indicated the group to which the species belonged, there, if it had come into general usage, he would favor uniform terminations.

Mr. Mann did not believe in uniform terminations.

4. When a Tortricid species is described with a name not ending in *ana*, should this be changed to *ana?* e. g., *Carpocapsa pomonella* Linn. Prof. Fernald himself was opposed to such a change. Dr. Morris suggested that Linne's names be left as he made them.

5. To what extent should the law of priority be made use of? Shall we make use of the oldest name, even if the species has been known under another for a long time? If not, for how long a time must a name universally or generally be in use to take precedence over an older name?

The sentiment of the meeting was strongly expressed that so much discussion without agreement had been hitherto had on that question, that no universally accepted conclusion could be reached

6. What should be taken as the starting point in nomenclature? Some have taken the 12th Ed. of Linne's Syst. Nat., while others have taken the 10th Edition.

Dr. McCook thought the rules heretofore adopted by the British Association covered that point in favor of the 12th Edition.

Prof. Fernald replied that many of the subscribers to that rule had now changed their opinions on that point, and had taken the 10th Edition as a starting point.

Mr. Smith said, the Noctuidæ alone considered, it made no practical difference which edition was used, and so far as Tortricidæ were concerned, he did not think that any practical difficulty would arise, whichever edition was used.

Prof. Fernald expressed surprise that so much discussion should have arisen over Hübner's works, and that his names should have been so universally rejected, while Guenee's names in the *Index methodicus*, unaccompanied by a word of description, were recognised and used without question. Hübner at least gave some sort of definition to his divisions, genera or *coiti*, so called.

Dr. Horn suggested that there might be some analogy to the cases of Erichson and Motschulsky ; both of these had created some genera, not, or incompletely described, but while Erichson's genera had been universally adopted, those of Motschulsky had been as universally discarded. The reason was, Erichson's genera usually meant something and had some solid foundation, and he himself had credited to Erichson some genera first described by him (Dr. Horn) under the names proposed by Erichson. Motschulsky's genera, on the contrary, were based upon the flimsiest characters as a rule, and had no value whatever.

Mr. Smith said that as to the Noctuidæ at least, the parallel would hold. Hübner's genera were very largely devoid of all foundation, while Guenee, as a rule, made pretty good genera and mostly described them.

Prof. Fernald thought this not true of the Tortricidæ ; that quite as many names of Guenee were baseless as of those proposed by Hübner.

Mr. J. H. Emerton announced that the types of a large number of the species described by him in his work on the " New England Spiders of the Family Theridiidæ," and all the types of a paper now in press, were at the Academy of Natural Sciences, and he would be happy to exhibit them to any who would make an appointment with him for that purpose.

On motion, the meeting was adjourned until 2.30 p. m., Sept. 4th, to meet then at the Entomological Rooms in the Academy of Natural Sciences, the use of this room having been offered by Messrs. Horn and Aaron on behalf of the A. E. S.

Pursuant to adjournment, the Club met at the rooms of the Am. Ent. Soc. at 2.30 p. m., Sept. 4th, Dr. Morris in the chair. The minutes of the previous meeting were read and adopted.

The committee appointed at the last meeting reported that they did

not consider that the scheme proposed by Mr. Westcott for the publication of an entomological periodical, a practicable one for the Club to undertake.

Mr. Smith gave an account of the secondary sexual characters of the Noctuidæ, illustrated by blackboard sketches, showing peculiarities of leg structure in the male butterflies and some analogous variations in the Deltoids, in which latter group the tibiæ often become aborted, while the first tarsal joint is often so abnormally developed that it is usually mistaken for the tibia. The peculiar brushes of the fore legs were noticed and some modifications commented on. The abnormal development of the last tarsal joint of *Palthis* was illustrated, as was also the peculiar palpal structure of the ♂ of that genus; so of antennæ, the peculiar bends and tuftings of the ♂, especially of the group *Herminiinæ*, were noted, as were the more usual pectinations. In conclusion, Mr. Smith mentioned the varying practice of systematists as to what generic value these characters should have. In some instances these male characters were wanting, while in all other respects the species agreed with others in which all these peculiar structures were well developed; on the contrary, occasionally a species would be found which offered some peculiar character in the ♂ not usually found in its near allies, instancing *H. paradoxus*, in which the ♂ has a pellucid impression in the fore wing, around which the venation is somewhat modified. What shall we do with such a species? The ♀ well fits into *Heliothis*. Shall the ♂ then authorize a genus where the ♀ offers no basis for it? Students of other groups should give their experiences.

Prof. Fernald said that in the Tortricids, generic, and even higher value, had been given to these characters. The costal fold was a prominent ♂ character, abnormally developed in many exotic forms. In a South India form it extends fully two-thirds across the wings, while in other Indian and Japanese species it is very wide, but not so abnormally developed. Families have been based upon these characters, and one genus has been based upon a character peculiar to the ♀ only. This genus he thought would have to be abandoned.

Dr. Horn said that in systematic work and in characterizing a species both sexes should be considered. It requires two individuals, a ♂ and a ♀, to make a single complete example of a species, and classification should consider these individuals together in assigning positions to them.

Synoptic work has a higher purpose than a mere aid to a recognition of species.

Prof. Fernald was interested in Dr. Horn's view of the case; he had been interested in the view that nature had no genera, but species only. For his part he thought he would be satisfied if he had a good definition of a species.

Dr. Maclosky said that birds sometimes offer remarkable differences in sex, and species can be distinguished only by a reference to both. The flickers, for instance, of the two sides of the continent were very distinct, but in some intermediate localities the species approached so closely that it was difficult, if not impossible, to distinguish the females, while the males were separable. There was no anatomical difference between the species, but he thought there must be physiological characters not yet discovered which separated them.

Dr. Morris thought it a curious classification that would place male and female in different genera if separately considered.

Mr. Osborn read a paper on *Mallophaga* and *Pediculidæ* of N. A., illustrated by drawings of specimens and slides containing specimens mounted for microscopic examination. (This paper will appear separately in the C. E.)

Miss Cora H. Clarke exhibited a specimen of the work of some Caddis Fly larvæ *(Hydropsyche)*, consisting of an aggregation of mud cells on a small stone, beyond which were the nets spread by the larvæ. They were always found in running water, and always had an opening toward the current, probably to enable the larva to catch the food coming down the current. In reply to a question from Dr. Morris, Miss Clarke said the nets were often solitary, but not unfrequently aggregations were found. Another species, of *Plectrocnemia*, builds a vertical tube of mud, sometimes with a number of branches; a specimen was exhibited. Dr. Hagen thinks it an undescribed form. Reference was made to figures in a paper entitled "Description of two interesting houses made by Caddis Fly Larvæ, by Cora H. Clarke." The larvæ living in running water were difficult to raise.

Mr. Mann remarked that *apropos* of raising larvæ living in running water, Prof. Barnard, of the Dept. of Agriculture, had contrived an arrangement with which he had great success with larvæ of that kind. It consists of a glass tube, the bottom closed by a porous cloth, the other

end fastened to a faucet; the water could be thus kept steadily flowing with any desired rapidity.

Dr. Morris exhibited a gall recently collected, the inclosed larva not bred, and asked for information as to the probable producer.

Mr. Mann said the subject of galls had puzzled him in his bibliographical work, especially as to the proper method of indexing them. He had referred to them under the head of systematic botany, but doubted his correctness.

Dr. Morris asked what orders of insects contained gall producers. Mr. Osborn thought about all orders except Neuroptera and Orthoptera. Mr. Smith said that at least one American species of *Apion* is known as a true gall producer, and in Europe several species are known to produce root galls. Mr. Osborn said that many plants, especially the *Rosacea*, were much subject to galls, while others were rarely if ever so infested. He thought them abnormal products so far as plants are concerned, and as rather belonging to insect economy since they are caused by insects; not only that, but insects were often most readily distinguished by the form of the galls, and in the case of mites those of the maple and ash were much alike, but produced very easily distinguishable galls.

Dr. Hoy thought the galls were pathological appearances, and were rather diseases of plants and should be classed as such. In descriptive botany they had no place, any more than in a description of the lips cancer should be treated of.

Mr. Mann stated he had also indexed them under pathological botany and under insects, but the chief difficulty had arisen through a descriptive paper treating galls from a botanical standpoint.

Dr. Morris said that he had seldom seen such a dearth of larvæ of all kinds, and butterflies were exceedingly scarce.

Mr. Saunders thought there had been no unusual want of insects in Canada. *Turnus* has been common, and so was *cardui;* the latter, indeed, had been extremely abundant in Manitoba, where it had destroyed large quantities of thistles, and caused great alarm on the part of farmers, who thought it would also attack their crops. *Thecla niphon*, usually rather a rare form, was found in some abundance this season, and in the early part of May quite a number of specimens were captured.

Dr. Hoy said that as compared with previous seasons, *cardui* has appeared in immense numbers, fifty for one. It had never previously to his knowledge attacked the hollyhock or sunflower. This season it has

litterally stripped the leaves from these plants, preferring them apparently to thistles. Other butterflies had been scarce.

Prof. Osborn said in Iowa butterflies had been unusually common.

Mr. Underwood said he had found butterflies unusually common in Central N. Y, *turnus* especially, but for five weeks spent in Conn. everything was scarce excepting *cardui.*

Prof. Fernald said in the first part of the season insects were very rare. Butterflies alone appeared about as common as usual, *turnus* unusually common ; *cardui* had been rare until this summer, when it was common. Last season Mrs. Fernald had collected both at sugar and at flowers cultivated because of their attraction to insects, and flowers had proved most productive ; this season the reverse has been the case.

Mr. Mann, referring to a remark made that cold winters were favorable to insect life, said that seemed to be the generally accepted theory now, and appeared borne out by facts.

Mr. Aaron said that everywhere insects are reported as exceedingly scarce. His brother from Texas so writes ; from Florida, Arizona and California come the same complaints. The remarks on the abundance of *cardui* reminded him of a saying of Mr. Ridings that he was always afraid of a season in which *cardui* was common, for then nothing else would be found.

Mr. Smith said he believed cold winters favorable to insect life, but this year there was not only a cold winter, but there were several very severe frosts late in spring, one as late as June 14th-15th ; it was rather these late frosts that were to be blamed for the dearth of insect life. On Cape Cod insects were unusually rare ; in Vermont, where hundreds of good insects were last year taken at sugar, scarcely one fourth the number of common forms were this year found.

Dr. Hoy said that in his vicinity, far north as it is, he has taken many insects usually considered southern—more than were taken on the east of the lake. There seems to be a northern extension of the thermal line on the west of the lakes. Last season he found four specimens of the black variety of *turnus ;* before only a single specimen had been found.

Mr. Saunders had never known this black variety to occur in Canada.

Dr. Merriam had found *turnus* in the central Adirondack region nearly as far north as Racine, three to four thousand feet above the sea. There were often hundreds at puddles, and among them many of this black variety.

Prof. Fernald reported the capture in Maine of a suffused form, partially yellow and part black.

Dr. Hoy asked whether all the food plants of *P. ajax* were known. He has found perfectly fresh specimens, and no pawpaw within 200 miles of the place. The butterfly is often common, but he has never found the food plant of the larva.

Mr. Larkin had noticed at his station south of Syracuse that insects were unusually scarce. The potato beetle even was very rare—not found at all in some fields. He had noticed that when they have winters that kill wheat, then usually the apple crop is good and there are few insects.

Mr. Aaron said in reply to Dr. Hoy's query, that *ajax* would feed on either spice-wood or upland huckleberry, as well as pawpaw.

Dr. Hoy said they had the huckleberry, not the spice-wood.

Mr. Osborn said he had seen *ajax* in Iowa where they had neither pawpaw nor the huckleberry, and he thought no spice-wood. He also reported a statement from Sioux City that there, *Chrysochus auratus* was so common that they were crushed under foot on the streets. Was not this unusual?

Mr. Mann said in the woods he had seen them piled in great heaps upon the stones.

(To be Continued.)

NEW CATALOGUE OF BUTTERFLIES.

We are glad to learn that a new edition of the Catalogue of the Diurnal Lepidoptera of America north of Mexico, by Wm. H. Edwards, is now in press and will shortly be issued. Since the last edition was published in 1877, a large number of new species have been described, and much information gained with regard to the geographical distribution of our butterflies. A work so much needed, prepared by so competent an authority, will be of great value to all who are interested in this department of Entomology.

CORRESPONDENCE.

Dear Sir: Mr. Lyman's objection to my statement of the size of *angulifera* is quite correct. No one could tell by it whether it was one inch or five in expanse of wing, and is only excusable from the nature of the communication, which was not a description of the insect, but only

the announcement of its having been found in Canada. I had the pleasure of several calls from Mr. Angus whilst he was on a visit to relatives in this neighborhood the latter part of the summer. The June No. of the ENTOMOLOGIST having just appeared, I gave it him to read. He said he had noticed in looking over my collection that the specimens of *angulifera* he had sent me were small in size and light in color; that they were bred specimens, which would account for that fact, and that he had full-sized insects in his collection. So that I presume that in nature *angulifera* will correspond in size with *promethea*, which is itself a rather variable insect, I having specimens ranging from 2¾ inches to 4½ in expanse; the Ridgeway specimen of *angulifera* being 4¼, whilst one of the N. Y. specimens is only 3½. I may mention that Mr. Angus said the caterpillar fed on the White-wood. J. ALSTON MOFFAT.

Dear Sir: I enclose a few lines from a letter received from Miss Annie M. Wittfeld, of Indian River, Fla., written 23rd Sept. last, showing one of the trials a lepidopterist is sometimes subject to.

Coalburgh, W. Va., Oct. 1, 1884. W. H. EDWARDS.

"Yesterday about day-break the weather was clear; about twenty minutes later a small black cloud arose in the south-east, and came along very fast, although with us there was a dead calm. We took little notice of it, till all of a sudden a terrible flash of lightning came down, followed instantly by a fearful clap of thunder and a puff of wind that took everything with it. It all lasted but a second, and then the sky was clear and calm again. Shortly after I went to the glass where I had had six full grown caterpillars of Limenitis *Eros* feeding, and I found them all dead and stiff. At the same time all my other larvæ, which were in wooden boxes, were unhurt."

OCCURRENCE OF THE BASKET-WORM IN ONTARIO.

Dear Sir: Some time ago Mr. A. H. Kilman, of Ridgeway, Ontario, paid me a visit, and brought some of his moths with him which he had collected at Ridgeway. Among them was one which I have no doubt was the imago of the basket-worm, *Thyridopteryx ephemeræformis* Haw. It was injured, and I had no example at hand for comparison. Has any one reported it from Canada, or from any place in New York north of Staten Island? D. S. KELLICOTT, Buffalo, N. Y.

The Canadian Entomologist.

VOL. XVI. LONDON, ONT., OCTOBER, 1884. No. 10

MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

(Continued from Page 179, Sept. No.)

Mr. Saunders said *Hyphantria textor* had this season been found in great abundance on all kinds of trees. *Van. progne* had been sent from one locality in West Ontario, where it was so common on currants that fears had been entertained for the crop. No great damage had been done, however.

Mr. Graef exhibited some species of Lepidoptera, rare, or typical of recently described forms.

On motion, the meeting adjourned to Monday, Sept. 8, at 2.30 p. m., same place.

Sept. 8th, 1884. Pursuant to adjournment, the Club met at 2.30 p. m., President Morris in the chair. The minutes of the previous meeting were read, corrected and adopted.

Prof. Martin exhibited some insects imbedded in copal, all representing types of post-tertiary forms, mostly small Hymenoptera and Diptera, but some Coleoptera, Lepidoptera and Hemiptera. The specimens were obtained by seekers of the resin of which copal varnish is made, not far from the sea coast, a little north and south of the equator. The same sort of gum is now found on growing trees, but soft, and not good for varnish, used only for the purposes of adulteration. The true gum in which these insects were found was obtained in districts where the trees had long been extinct, and was found only by digging. All the species were post-tertiary forms, and he had especially noted types of *Cleri*.

The specimens, which were very clear, were handed to the members for examination.

Dr. Horn said that the Coleoptera all represented existing generic types: 1 Carabid, allied to *Callida;* 2 Chrysomelids, 2 Clerids, *Clerus ocymatodera;* 2 Longicorns allied to *Clytus* and *Leptura*, and an Elaterid much like one of our species of *Cardiophorus*.

Mr. Smith said the Lepidoptera were all of very recent types; one specimen was almost surely a *Mamestra*. The Hemiptera were also very like species known to him, and at least one Dipteron represented a very common Muscid type.

Prof. Lintner gave some notes of observations made during the past year.

Orgyia leucostigma, else very common and destructive at Albany, was this season very rare, and did no damage. Usually they defoliated the elms and horse chestnuts, and sometimes when a heavy storm came on so many were destroyed that they became offensive. This rarity is explained by a severe frost which occurred in spring just as the larvæ were hatching.

An interesting note came from Prof. Cook, of Michigan, where thousands of a Noctuid larva created fears for crops. The larva was bred, and proved to be *Agrotis fennica*, usually considered rather a rare insect. So common were they that they were called the black army worm.

From Jamestown, N. Y., an Hemipterous insect, *Podisus cynica*, has been received, and it was there observed destroying the currant worm in numbers. Its variety, *P. bracteata* Fitch., was associated with it.

From the vicinity of Rochester *Lygus lineolaris* has been recorded as injurious to young peas, piercing and blotching them, a fact not previously noted.

At Geneva, N. Y., *Poecilocapsus lineatus* has seriously injured gooseberry plants, stinging the branches at tip so that they died off two or three inches downward.

In Coleoptera, the Clover-leaf Beetle has spread westward, and has nearly reached the western limits of the State. Some three years since it was recorded from Yates and adjoining counties, and since has spread rapidly; moreover a new habit has been acquired, *i. e.*, it now has attacked beans. The insect is *Phytonomus punctatus*, an imported species.

The Asparagus Beetle, *Crioceris asparagi*, has made its appearance at Geneva, N. Y. Heretofore it has been confined pretty closely to the sea shore, and though known for many years on Long Island, it has never before manifested any tendency to spread.

From Sycamore, Oswego Co., an interesting attack of *Otiorhynchus ligneus* was reported; there a house which for four years had been closed, was opened and found swarming with these beetles; they were everywhere, and in many rooms nearly a quart was swept up. What did they feed on? There was nothing eatable in the house: they had been re-

corded as feeding on the roots of strawberries, but what they could find in the house puzzled him.

The Elm-leaf Beetle, *Galerucella xanthomelaena*, has been very destructive in Long Island and in West Chester, many of the noble elms being so entirely stripped that their death is expected. Nothing entirely new has presented itself during the year.

From Mexico had been received specimens of a seed, probably of a *Euphorbia*, known as the jumping seeds. The seeds apparently are formed in a pod, three in one inclosure. When placed on a hard surface they begin a series of the most erratic movements, tumbling from side to side, and sometimes making leaps of an inch or more. Inclosed in the seeds is a white, somewhat flattened larva, and the seed itself, a mere shell, is lined with reddish silk. Westwood has raised the larva to maturity and found an insect very closely allied to *Carpocapsa pomonella*, which he called *C. saltitans*. At about the same time Mr. Lucas, in France, also received the insect, and not knowing of Westwood's work, re-named the species. The entire life history of the species is not yet known ; it is supposed that the insect deposits its egg on the young seed, and the larva when very small makes its way into it. No trace of an opening was now visible. Westwood and Lucas report the insect as obtained in February, but only a few days ago a specimen was caught flying in the room. The curious thing is the close resemblance to our *C. pomonella*, which has no such habits. Referring to Mr. Smith's remarks on tuftings of the feet of Noctuidæ, *C. saltitans* is peculiar in having the tarsi hidden by long tufts of scales.

Mr. Dimmock says that *O. leucostigma* has not been abundant near Boston, and that the spring frosts affected the eastern rather than the western portions of the State.

Mr. Smith replied that on Cape Cod he had found the larvæ so abundant that they stripped the trees everywhere, and there had been frost enough to kill a large quantity of vegetation.

Dr. Horn said it is a remarkable fact that all of the Coleoptera mentioned by Prof. Lintner are imported species, and for the most part they have kept pretty close to the sea shore. It is interesting that they have commenced their journey toward the interior ; it was to be expected, however, that eventually they would travel along the lines of their food plant, as did the potato beetle from west to east. At Washington he had noticed the elm trees stripped of their leaves. Another species, *Crioceris*

12-punctata, has of late been taken by Mr. Lugger around Baltimore. It is rather curious that the neighborhood of Baltimore and Alexandria, with comparatively a very limited commerce, should still have yielded a proportionately very large number of imported species. Two species of *Blaps* have been introduced and first found near those cities, one *mortisaga*, and another not yet determined. Of *B. mortisaga* a friend said that a bushel could be taken from a single cellar in Alexandria. Another very curious matter is the very sudden spread of insects. When working over the Rhyncophora some years since with Dr. LeConte, every collector was applied to for material, and from Mr. Fuller was obtained a little species, marked Montana, which was named *Aramiges Fulleri*, and was then the only known specimen. Suddenly, a year or two afterward, specimens were received for determination from all parts of the country, and everywhere complaint was made of injury caused by the species, especially in hot houses. How happened it that for ages the beetle was unknown, an inhabitant of some remote locality, and suddenly it should spread all over the States?

Prof. Lintner said he had known the species since 1876; that year it was abundant in green houses.

Mr. Dimmock had known the species for some years as very destructive to roses in hot houses.

Dr. Horn said he first obtained the beetle in 1874, or perhaps a little earlier.

Mr. Hulst, referring to Prof. Lintner's remarks on *O. leucostigma*, had noticed its comparative scarcity on Long Island. The elm beetle was common. Another pest not mentioned was a small insect apparently of the frog spittle nature on maple. Sometimes the trees were white with it, and many appeared dying off. A species of *Chrysops* was also common, and seems to have been destroying the pest.

Prof. Lintner had noticed the same insect; it is a Coccid, *Pulvinaria innumerabilis*.

Prof. Osborn said it is very abundant on maple. It can be subdued by cutting the infested branches before July. The young go first to the leaves. The female lives until spring, the male dies in the fall. No less than seven different species of insects prey upon this form.

Mr. Saunders said the insect had appeared in Canada and Michigan in large numbers, the trees being sometimes completely covered. On some trees the larvæ of *Chilocorus bivulnerus* were found feeding on them

in such numbers that they had caused alarm ; persons finding them supposed that they were the parents of the pest.

Mr. Underwood inquired whether this insect was not also found generally on elm. Mr. Rathvon had published an article on the subject, and had referred to its feeding on elm as a rarity. It had been observed also on grape and *Ampelopsis*.

Mr. Saunders had not observed it on elm in Canada.

Dr. Horn made some observations on secondary sexual characters of Coleoptera. He had been interested in Mr. Smith's studies on the external anatomy of Lepidoptera, and especially in the remarks on secondary sexual characters. Somewhat similar antennal structures were sometimes found in Coleoptera, but their uses in this order seemed better known. In *Collops* was a structure closely resembling that of *Renia*. Here there was the same excavated curved joint, at the base of which was an articulated slender spine-like appendage, and the upper part of the antennæ was capable of being folded backward. The use of this was in copulation ; the ♀ antennæ were grasped in this curve, the articulated spine closed the curve by being directed forward, while the anterior part of the antennæ was folded backward, thus tightly holding the ♀ antennæ. The form in *Meloe* is similar to that of *Herminia*, and without the articulate spine still serves the same purpose. In *Sphalera* and *Tomoxia* there is a double jointed appendix to the last joint of the maxillary palpi which probably served the same purpose. These structures are explainable. Others are more obscure and not yet explained. For instance, *Lebia* has a notch on the inside, near the end of the middle tibia in the ♂. A species of *Aphodius* has a very curiously hooked first tarsal joint to the hind leg. Another species has a peculiar club-shaped appendage to the inner side of the fore tibiæ. What use these served was not yet satisfactorily ascertained.

Mr. Cresson said that except in the parasitic forms, there were no such characters in the Hymenoptera, and that group he had not studied.

Mr. Osborn stated that very interesting characters occurred in the Mallophagidæ, and especially one in *Lipeuris*, which much resembled that of *Tomoxia*.

Mr. Smith moved the appointment of a committee of three to arrange a programme and secure papers for the next meeting ; seconded and carried. The committee appointed consisted of Mr. J. B. Smith, chairman ;

and Messrs. Herbert Osborn and B. Pickman Mann. On motion the Club then adjourned, to meet again under the rules at the next meeting of the A. A. A. S.

(The above has been compiled chiefly from the excellent report of the Secretary, Mr. John B. Smith.—Ed. C. E.)

COLEOPTERA IN SEPTEMBER ON BRIGANTINE BEACH, N. J., ON THE ATLANTIC COAST.

BY JOHN HAMILTON, ALLEGHENY, PA.

Coleopterists accustomed to collect on the sea shore may find little that is new to them in this article; but to those from the interior, making only occasional short visits, it may be useful in directing attention to some of the less common insects, and to some not likely to be found by one unacquainted with their habits. Brigantine Beach is somewhat insular, being six or seven miles off from the main land, yet none of the Coleoptera mentioned are peculiar to it, and, being mostly maritime species, probably occur in suitable situations all along the coast from New York southward indefinitely.

This beach is nothing more than a succession of sandhills elevated from five to ten feet above the line of high tide, two or three hundred yards wide, fronting on the ocean and extending from inlet to inlet about six miles. Some of these hills are thinly overgrown with coarse grasses; and others with thickets of *Myrica cerifera* (Bay berry), interspersed with *Rosa lucida* and clumps of *Baccharis halimifolia*, so conspicuous in this month by its abundant, very long and white pappus. Back of these hills to the Bay are the salt meadows, from five to seven hundred yards in width; they are overflowed by the high tides in spring and autumn, though several inches above the ordinary ones of winter and summer; they are always damp, and support a growth of coarse grass, sedge, etc. At first sight this does not appear to be a very promising field for the Coleopterist, and yet the catalogue contains nearly three hundred species.

Panagæus crucigerus Say annually rewards the careful searcher with a few specimens, occurring mostly on the little circular elevations on the meadows under pieces of wood and the debris left by the high tides.

Philhydrus reflexipennis Zimm. is found in the shallow fresh water pools that are formed at the base of the sandhills, together with *Hydro-*

philus glaber, while *P. ochraceus* is abundant on the meadows under boards and pieces of wood.

Emplenota maritima Casey. This minute insect has only recently received a name, generic and specific. It is found in moderate abundance on the coast under the debris cast up by the waves and left by some of the higher tides along the high-water line, after it has remained undisturbed for three or four days. It is readily recognized by its great resemblance to a small Aleochara; length, .12 to .16 inch; head deflexed; sides of abdomen strongly margined; color piceous black with the anterior border of the abdominal segments pale. It is usually found in company with *Cafius bistriatus* and *Phaleria testacea*, without vigilance it will be overlooked. (See Number I., Contributions to the Descriptive and Systematic Coleopterology of North America, by Thos. L. Casey, Lieut. of Eng'rs, U. S. A.)

Quedius brunnipennis Mann. is sparingly found under the debris left by the high tides along the margins of the meadows. *Staphylinus prælongus* Mann. occurs in the same situations much more abundantly. *S. vulpinus*, *S. tomentosus* and *Ocypus ater* are found with it rarely, and more properly belong to the main land.

Cafius bistriatus Er. is met with as stated under *E. maritima*, and is rather abundant. The debris should be shaken over the white sand, on which the insects may readily be seen as they fall. It is easily known by its brown color and bistriate thorax.

Bledius mandibularis Lec. is exceedingly abundant in the meadows on bare sandy places not often covered by the tide, but kept constantly damp by capillary attraction. One, as in the case of the writer, might pass over them for years unconscious of their presence till discovered by accident. They live in galleries at a depth of from six to ten inches beneath the surface, the entrance to which is surrounded by castings similar to those made by earth worms. The upper portion of these openings is used by two or three species of small crustaceans for a retreat, and when the novice scoops over the wet sand, finding these and considering them the excavators, he goes no further, and the real architect several inches deeper escapes detection. The species is one of the finest of the genus.

Bledius cordatus Say, though existing in countless multitudes, is not often found, being small, and mostly inhabiting the grassy parts of the meadows. They occasionally fly at night in swarms, but whether this

occurrence is periodically habitual, or accidental from some local cause, is not known. I obtained nearly an ounce bottle full of them on the night of Sept. 28th, 1883, and could easily have procured half a pint. The evening was warm and sultry, and exceptionally calm. When the central chandelier in the parlor of the hotel was lit, my attention was directed to a fall of small insects from the lights to a marble-topped table beneath. I saw they were brachelytra, and in a couple of hours (the duration of the flight) had taken from this table the quantity stated. They invaded all the lower parts of the hotel where there were lights, occasioning no small annoyance. They proved to be of this species. No one connected with the hotel had ever noticed them before; none occurred the next, or subsequent evenings. This year I left on the 26th without having observed a single one, though they were doubtlessly present in millions.

Rhypobius marinus Lec. is met with abundantly on the elevated places on the meadows under debris that lies on dryish sand. It is interesting chiefly on account of being so minute. The only other species of the genus known to me is found here on leaves, generally hickory and walnut; it is much larger and as yet undescribed. With *marinus* is found in great abundance *Anthicus formicarius* and *Bembidium constrictum*.

Anisosticta seriata Mels. is usually taken about the remains of dead animals, but not plentifully. Whether it is carnivorous, or only resorts to such places for shelter, is not known, but I never found it elsewhere. The ornamentation of the elytra is a little variable. Normally there are three large common sutural spots connected by a line, and three marginal spots slightly connected on the margin, black; these spots, however, may all be isolated; or the marginal ones become confluent, and also unite with the posterior sutural spot which usually extends to the margins of the elytra. The amplification of Melsheimer's description by Mr. Crotch in the Trans. Am. Ent. Soc., vol. 4, p. 369, is quite misleading.

Dermestes Frischii Kugel occurs on the sandhills among the refuse of fish. This year only a few specimens were obtained on account of the food supply having been minimized.

Hister arcuatus Say. Specimens of this beautiful species are occasionally taken on the sand, but I could never find its habitation.

Monotoma producta Lec. occurs in the same situations as *R. marinus*, where it is difficult to see, as it feigns death, and then resembles fine particles of the debris. A good way to obtain it is to examine the underside

of chips and pieces of wood, to which it often clings in considerable numbers, and where also will be found *Mantura Floridana*.

Aphodius phalerioides Horn is rare, for during eight years only three specimens were found, and the circumstances of their occurrence were not noticed, as they were in the collecting bottle with the superabundant *Phaleria testacea*, from which they can only be separated by careful examination.

Ataenius. An undescribed species is found on the meadows under moist decaying debris. This species is about the size of *stercorator*, and one of the finest of the genus. It may be known by its fine, narrow elytral striæ, with small, close tranverse punctures; broad, flattish intervals, and deep piceous black color.

Trox scabrosus Beauv. is rare, being met with in dry sand under desiccated human excrement, or under boards in its vicinity; and here it may be remarked that no Coleopterous insect in any stage seems, on this island, to inhabit the ejectamenta of herbivorous animals. *T. asper* and *T. suberosus* may be found sparingly about the remains of dead animals, but such are rare.

Ligyrus gibbosus DeGeer comes at night to light in vast numbers. In the office of the hotel in less than one hour, one evening, over a hundred specimens were taken. It seems to be distributed in the United States from the Atlantic to the Pacific.

Euphoria areata Fab. is likewise a widely distributed species in the warmer arenaceous districts, but not recorded as occurring west of Texas. What its habits are in other places and at other times is unknown to me, but my experience with it is this: Sept. 9th, 1877, about ten o'clock in the forenoon, five specimens were taken flying about a small sand hill crowned with wild rose bushes; next day about 100 were taken from ten to twelve, and the succeeding day five or six at the same hours, but none on any subsequent day. The next year I reached there on the 15th, but saw none that season. The third year I came on the 5th, but none appeared till the 10th, when about thirty were taken, and on the next twenty, but none thereafter. From that year till the present I was never there previous to the 12th of September, and no specimens occurred. The present year I came on the 9th, and took two specimens at the usual hour on the 11th, but none thereafter. Back of this sand hill, in 1877, was about half an acre of cultivated ground, which was abandoned three years ago. I infer from all this that the insects I met with were bred in

that garden ; that they completed their transformations annually about the same day, and emerging from the earth about the same hour immediately resorted to the nearest sand hill to find a place suitable for social hybernation.

Galeruca maritima Lec. is more abundant on the meadows earlier in the season, though a number may still be found under any stick or board that affords them shelter. Their color varies from pale to brownish black.

Epitragus arundinis Lec. is found in warm days on the sand, or on the board walks, but not plentifully.

Anthicus pallens Lec. is rarely found. It occurs on the sand hills in the loose sand under or near human excrement that has dried up, or been partly consumed by *Saprinus Pennsylvanicus*, *Sphæroides fraternus*, &c. By carefully scooping over the sand to the depth of five or six inches a specimen may rarely be taken, though it requires patience and close watching, as they are few and far between, and white like the sand.

Anthicus confusus Lec. is met with frequently in cultivated places under decaying vines and weeds. Three or four other species of this genus are likewise found here, but are not determined.

Sphenophorus retusus Gyll. frequents dry sandy mounds that support a sparse growth of coarse grass, where it may be found sparingly on very warm sunny days. It is easily known by the smooth rhomboidal figure on the thorax, and the elytra no longer than the head and thorax together.

S. costipennis and *S. pertinax* are sometimes found in dry places under sods, and *S. placidus* occurs in large numbers under logs that have drifted upon the meadows and become embedded in the wet soil.

Except incidentally, is omitted all mention of such maritime species as are abundant, and the many that are likewise found inland, besides a large number of no particular interest at present. Species often find their way there accidentally, being blown by the wind and otherwise transported from the main land, or cast up by the waves. At this season among the former is *Cicindela modesta* Say.; among the latter, *Calosoma scrutator*, *Purpuricenus humeralis* and *Pachylobius picivorus*.

The *Carabidæ* and *Staphylinidæ* are in general well represented, while the *Elateridæ*, *Buprestidæ*, *Lampyridæ* and *Cerambycidæ* seem to be entirely absent as regular inhabitants.

THE MELSHEIMER FAMILY AND THE MELSHEIMER COLLECTION.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

The Melsheimers have been considered by Th. Say to be the fathers of Entomology in the U. States. Nevertheless very little is known about them, and that little is not perfectly accurate. In fact, concerning the older Melsheimer there exists only a note in A. W. Knoch's "Neue Beitraege zur Insectenkunde," 1801, p. 18, and concerning his second son only the necrology by the late Dr. John L. LeConte in the Proc. Acad. Nat. Sci. Phil., 1873, p. 257, reprinted in the CAN. ENT., vol. vi., 1874, p. 39.

Through the courtesy of Dr. Geo. H. Horn, the manuscript diary of Dr. Carl Zimmerman is before me, which contains the following statements :—

"From York, Pa., I walked 18 miles to the S. W. to Hanover, where I arrived Jan. 7, 1834. Introduced to a Mr. Lange, the owner of the only press in the town, and editor of the Hanover *Gazette*, I was informed that the older Melsheimer died 20 years ago. Mr. Lange had been well acquainted with him, and the widow and several children are still living in the town. The following I copied out from the obituary in the Hanover *Gazette* at the time of Melsheimer's death :—

"'Friedrich Valentin Melsheimer, minister of the Evangelic-Lutheran Church in Hanover, died June 30, 1814, in consequence of a lung disease of 30 years duration, 64 years, 10 months and 7 days old. He was born Sept. 25, 1749, at Negenborn, in the dukedom of Brunswick. His father, Joachim Sebastian Melsheimer, was superintendent of forestry to the duke. F. V. Melsheimer was sent in 1756 to school in Holzminden ; in 1769 he went to the university in Helmstædt. He received, 1776, the appointment as chaplain to a regiment, which he accompanied to America, and arrived July 1st in Quebec. In 1779 he came to Bethlehem, Pa., and married, June 3, Mary Agnes Man, by whom he had 11 children. From August 19, 1789, he was minister in Hanover, Pa.'"

Dr. Zimmermann called on Mrs. Melsheimer, and was told by her and her daughter that after his death his eldest son, Johann Friedrich Melsheimer, succeeded his father as minister, whose love for natural history he had inherited, together with his collection and library. This J. F. Melsheimer is the entomologist quoted so often by Th. Say. The year of

his death is not known to me; at least it was some time before 1834 and after 1824, where he is quoted by Th. Say in his Amer. Entomology by *Anthicus bicolor*. The father, F. V. Melsheimer, was in correspondence with the well known German entomologist, A. W. Knoch, in Brunswick, who states in the volume before mentioned that up to 1801 he had received from him over 700 American insects. He gives still very valuable descriptions of 23 species.

F. V. Melsheimer published, besides some papers on religious matters, the well known catalogue, "A Catalogue of Insects of Pennsylvania," by Fred. Val. Melsheimer, Minister of the Gospel, Hanover, York County; printed for the author by W. D. Lepper, 1806, Part I., small 8vo., pp. 60.

The catalogue (I am indebted for a copy to my friend, Ph. R. Uhler, of Baltimore), is now very rare, and contains the names of 1,363 species of beetles, among them 460 named by Knoch. It seems that at this time Melsheimer had not received Knoch's book, published 1801, as his names do not coincide with those described by Knoch. As the dedication copy of Knoch's book to Melsheimer is in the library of the Museum in Cambridge, it came probably to Melsheimer after 1806. This catalogue contains the first list of American beetles, but without descriptions, and has therefore only an historical value. Of the 1,363 species, only 205 are now surely known, and only 134 are quoted in Dr. F. E. Melsheimer's catalogue.

After the death of the eldest son, the second, Ernst Friedrich Melsheimer, inherited the collection and the library. He was a country physician and lived near Dover, 14 miles north of Hanover. Zimmermann visited him the next day, and his diary contains the following statement:—

"The house, rudely put together with boards, painted red, stood all alone in the middle of a forest, and looked more like a hut. His wife was at the spinning wheel. The reception was indeed very cordial, and when he heard that his father's book was well known and mentioned in German, English and French works, which he never had dreamt of, he became animated and talked with great interest on entomological matters and books.."

Zimmermann wondered how he was able, in his isolated position, to keep up such a lively interest in natural science, to collect so industriously, and to study his small library, in which the magazines of Illiger and Germar were the most prominent and most valued. Though he

could not claim to equal the stars among the entomologists in Europe, he filled very well the place of a first rate entomologist in America. The next day was spent with the collection, which contained chiefly Coleoptera and Lepidoptera, and only little of the other orders, apparently on account of the want of books about them. The collection was kept in good order, and all labels in his father's handwriting were on the pin of the same specimen to which they were originally attached.

"Melsheimer," says Zimmermann, "lives with his family on a very plain but good fare, as is generally the case in America. Many little and cheap comforts were wanting, but their absence was not felt. Indeed there was no drinking glass in the house; cans or dippers served for the purpose. The cordial hospitality made one forget the lack of comfort."

Twice more, July 12, 1839, Zimmermann visited Melsheimer in company with Pastor D. Ziegler, and August 20, 1839, with Rev. Morris, of Baltimore.

Already in 1832, Dr. Melsheimer had the plan, as Zimmermann states in 1834, to publish, with Th. Say, a new catalogue of the Coleoptera of N. America, which was prevented by Th. Say's premature death in 1835. Dr. LeConte says in the obituary that his father (the name E. F. Melsheimer is an error for F. V. Melsheimer) has been an active collaborator with Th. Say. This could not have been, as the father died 1814, and Th. Say began to work in 1817. This active collaborator was the eldest son, J. F. Melsheimer, quoted often by Th. Say, and later the second son, Dr. Melsheimer. The work advanced slowly. In a letter to Th. W. Harris, Nov. 24, 1842, Dr. Melsheimer states that "a few literary gentlemen in Pennsylvania and Maryland have entered into an association for the advancement of entomology in our country (the Entomological Society of Pennsylvania). Their first object in view is the publication of a catalogue of the known Coleoptera of the U. S. The members of the Club have prevailed on me to compile the work and have it ready for the press against the ensuing spring!!" Dr. Melsheimer was elected President of this Club, of which, as far as I know, Rev. John G. Morris, of Baltimore, is now the only survivor. Dr. Melsheimer complains to Th. W. Harris that the work, though only a compilation, is very difficult, and advances slowly. It was published only ten years later, as it had been determined that the unknown species should be described. In the meantime Rev. David Ziegler, in York, Pa., seems to have been a very active collaborator. He has published in Proc. Ac. N. Sc. Phil., 1844, v. ii., p.

43-47, p. 266-272, 36 new species. Nothing more is known about him, but he must have been in very kind relations with Dr. Melsheimer, to judge from the contents of his collection, which is now in the Museum in Cambridge. It seems that they divided between them every lot of exotic species received by each, and for American species it is nearly the same. Dr. Melsheimer also published in the Proc. Ac. N. Sc. Phil., 1844-47, vol. ii. and iii., 431 species (vol. iii., p. 181, it is erroneously stated, 600) of Coleoptera hitherto not described. Only 172 of them have been retained in Crotch's Catalogue. Finally the Catalogue of the described Coleoptera of the U. S., by Fried. Ernst Melsheimer, M. D., revised by S. S. Haldeman and J. L. LeConte, Washington, 1853, 8vo., pp. 174, was published by the Smithsonian Institute. The revision had necessitated a long delay after the delivery of the manuscript. Nobody can say now how much belongs to the revisers, but it is to be presumed that their task was not a small one. "It was the first work," says LeConte, "of bibliographical importance in the modern history of that branch of science, and gave a powerful impetus to its development in the U. S., and has greatly diminished the labor of those who have continued the study of that department."

Dr. Melsheimer was then 71 years old, and has probably later done no more entomological work, except that he arranged his collection in accordance with his new catalogue. When 82 years old he sold the collection to Prof. L. Agassiz, and died March 10, 1873, in Davidsburg, York Co., Pa., aged nearly 91 years. His birthday is not known to me; it must have been in 1782.

I cannot refrain from giving here again Dr. LeConte's kind parting words: "Living an isolated life on his farm, remote from usual lines of travel, dependent almost entirely on letters for the sympathy and counsel of his fellow students, separated from libraries containing the results of modern research, and therefore dependent on the traditional knowledge received from Europe, which constituted in fact most of the intellectual capital of the founders of natural history in the United States, Dr. Melsheimer must be considered as a very remarkable instance of one who, with very limited opportunities, has worked honestly, to the extent of his abilities, to develop the powers of usefulness which were given him. Modest, unpretending, affectionate to his family, devoted to his friends, industrious to the limit of human usefulness, his death at such an advanced age can only leave, with those who have enjoyed his acquaintance, a satis-

faction that they have known so good a representative of the purer qualities of humanity."

THE MELSHEIMER COLLECTION.

As stated before, Dr. Melsheimer, when 82 years old, sold in 1864 his collection to Prof. L. Agassiz, who also bought at the same time Rev. Ziegler's collection. Dr. Melsheimer had preserved, as LeConte states, the only authentic types of many of Mr. Say's species for later investigators. Prof. L. Agassiz has told me that he had invited LeConte to take over into his collection all types and species out of both collections which he needed for his studies; these have been returned to the Museum now with LeConte's collection. In his letter which promised the donation of his collection to the Museum, (Ann. Rep. of the Museum for 1875, p. 35) LeConte says: "My collection contains specimens carefully compared with those described by Say, Harris, Melsheimer, Haldeman and Ziegler, and *all the unique types* of the three last named authors."

The Melsheimer collection filled 41 home-made wooden boxes, painted outside with light gray color. They are 10½ by 14 inches, and 2 inches high. Inside lined with white glazed paper; the bottom of the apparently older ones of plain wood, the newer ones lined with Helianthus pith. The cover is a board with the margins around planed off half an inch, to trim into the box. The beetles were arranged on transversal lines parallel to the smaller side of the box. On those lines were pasted the printed labels of the genera and species cut off from the catalogue published in 1853. The labels of the exotic species were written on colored paper and also pasted in. By this arrangement, after the publication of his catalogue, he had removed nearly all labels from the pins, also those of his father. Only exceptionally some labels of Say and some foreign authors were retained. Indeed the old beetles of his father are to be recognized by short common pins, and the beetles of Dr. Melsheimer by German pins from Carlsbad, a little shorter than those now used. I am often able to recognize in LeConte's collection the specimens taken out of the Melsheimer collection.

The contents of the collection are taken from the receiving book of the Entomological Department of the Museum, recorded with scrupulous accuracy by Mr. Ph. R. Uhler (Ann. Report of the Museum for 1864, p. 35):—

"The collection was received Sept. 1. 1864; bought for $150. It

contained, netto, 4,941 species, with 14,474 specimens. Coleoptera, 4,674 species, with 14 075 specimens, of which belong to U. S., 2,200 species, with 10,272 specimens; from Europe, 1,894 species; Brazil, 422; Mexico, 8; West Indies, 9; Siberia, 4; China, 74; Java, 8; Africa, 39; Australia, 14. The other insects were, Hymenoptera, 148 species; Hemip- 28; European Diptera, 90; Lepidoptera, none."

The contents of the Ziegler collection were, after the same Report, netto, 5,302 species, with 11,837 specimens. U. S. Coleoptera, 1,794 species, with 6,262 specimens. From Europe, 1,729 species; Brazil, 378; Mexico, 34; West Indies, 40; Siberia, 21; China, 55; Java, 12; Africa, 110; Australia, 14, besides Lepidoptera, Orthoptera, Neuroptera, Hymenoptera, Diptera. The Ziegler collection filled a cabinet with 45 boxes in three rows. The boxes are a little smaller than the Melsheimer ones, the bottom of plain wood, the cover with a pane of glass. Every species had a square written label on the pin, with the name and the locality.

When I arrived here in 1867, both collections were in their original state. As the boxes were far from being safe, they needed a very careful supervision, being more easily entered by pests than all other ones. How much had been destroyed before I arrived, I do not know; but it could not have been more than a small number of specimens, to judge from the gaps in the series of specimens. LeConte has not retained in his collection the somewhat cumbersome labels of Ziegler, nor labeled the Melsheimer specimens.

In 1872, after LeConte had decided to present his collection to the Museum, we had together a serious consultation if it was of any importance to science that both collections should be retained for ever in their original shape. LeConte was decidedly of opinion that it would not be of any scientific value, the more so as all specimens of importance had been transferred into his collection. As the original boxes were unsafe, and as by a transfer of both collections into new safe boxes, the originality of the collections would be lost to a considerable extent, we agreed that the insects would be better incorporated into the collection of U. S. Coleoptera of the Museum. This decision was approved by Prof. L. Agassiz, as in this way a permanent centre of infection and danger for the other collections of the Entomological Department would be abolished. I have myself put on every pin a small printed label—Melsheimer or Ziegler—to record the former proprietor. Nevertheless, some time later,

when I had no control of the Coleoptera, a somewhat cranky assistant threw away labels by the bushel, without any consideration whether they were types or in the handwriting of the most eminent entomologists, and replaced the labels by numbers referring to a carelessly written catalogue. A number of families of the Melsheimer and Ziegler collections shared the fate of this destruction.

NOTES ON MALLOPHAGA AND PEDICULIDÆ.

BY HERBERT OSBORN, AMES, IOWA.

[Read before the Entomological Club of the A. A. A. S.]

Identical or very similar species of these parasites occur on the closely related birds and mammals of Europe and America, as is shown by the following list of species collected at Ames :—

DOCOPHORUS.

D. platystomus N. On *Buteo swainsonii*, differs slightly from Denny's description and figure. In Europe occurs on *Buteo vulgaris*.

D. cursor N. On *Otus vulgaris* var. *Wilsonii*, differs from Denny's description in having lateral fasciæ on seven segments, the eighth being entirely dark, the ninth white ; foveolæ arranged differently on the fasciæ. But these points agree well with Piaget's figures, so there may be a discrepancy in Denny's work. In Europe occurs on *Strix (Otus) brachyotus*, according to Piaget, and *vulgaris* and *brachyotus*, according to Denny.

D. testudinarius D. On *Numenius longirostris*, agrees quite perfectly with Denny's description of specimens from *Numenius arquatus*. also with Piaget's figure.

D. cygni D. On *Cygnus buccinator* (?) Identical with descriptions of European specimens from *Cygnus musicus*, according to Piaget, and *C. Bewickii*, according to Denny.

Specimens belonging to this genus were also taken from Shrike, Hairy Woodpecker, Tern, Crow, Blackbird, Finch, House Martin and Coot, but are as yet undetermined.

NIRMUS.

N. fuscus N. On *Buteo swainsonii*. Differs slightly from Denny's description and figures of specimens from *Buteo vulgaris*.

N. brachythorax G. On *Ampelis garrula.* Agrees very closely with descriptions and figures of specimens from the same bird in Europe.

N. candidus N. On *Colaptes auratus;* also same species, probably, from *Picus villosus.* Differs from descriptions of specimens from *Picus canus* and *P. viridis* of Europe in some details, and further material may perhaps establish it as a variety.

Also undetermined *Nirmi*, from Crow, Meadowlark, Pelican, Yellow-headed Blackbird, Duck and Avocet.

ONCOPHORUS.

O. minuta N. On *Fulica americana.* Occurs in Europe on *Gallinula actinopus, orientalis* and *haematopus*, according to Piaget, and probably equals Denny's *N. fulicæ* from the *Fulica atra.*

LIPEURUS.

L. baculus, N. On domestic pigeons. No apparent difference from European specimens.

L. squalidus, N. On *Anas boschas.* Apparently here, as in Europe, common to many species of ducks. Also undetermined *Lipeuri* from Crane, Avocet, Bittern and Snipe.

ORNITHOBIUS.

O. bucephalus G. On *Cygnus buccinator.* Agrees closely with descriptions of specimens from *C. musicus.*

TRICHODECTES.

T. retusus N. On *Putorius erminea.* Occurs in Europe on *Mustela vulgaris.*

T. scalaris N. Common to cattle the world over.

T. parumpilosus. Common to horses.

Also specimens in this genus from the Pocket Gopher, *Geomys bursarius*, apparently undescribed.

MENOPON.

M. pallidum N. Common to domestic fowls.

Also several undetermined species.

COLPOCEPHALUM.

C. flavescens N. On *Nauclerus furcatus.* In Europe said to occur on various Raptores.

Also undetermined *Colpocephali* from *Scops asio*, *Junco hyemalis*, *Bubo virginianus*, *Melanerpes erythrocephalus*, and a duck.

NITZSCHIA.

N. pulicare N. On *Chætura pelasgia*. Abundant on every bird of this species that I have examined. The eggs were always found attached to the feathers on the back of the head, and on no other part of the body. Apparently no difference between these and those on *Cypselus apus* in Europe.

TRINOTON.

T. luridum. On *Anas boschas*. Occurs in Europe on many species of ducks.

PEDICULIDÆ.

Pediculus capitis and *vestimenti* and *Phthirius inguinalis* naturally present no variations.

HAEMATOPINUS.

H. piliferus. On dog. Has not been found common.

H. eurysternus. On cattle. Common, and without any noticeable variation. A related species, though quite different, has also been secured from cattle, but as yet not harmonized with any European species.

H. acanthopus. On *Arvicola*. Agrees closely with European.

Specimens of undetermined *Haematopini* presenting very marked characters, have been taken from five different species of Rodentia, the specimens from one of these *(Geomys bursarius)* differing so greatly as to necessitate a revision of the generic characters, or else the forming of a new genus.

The author desires to make a careful study of these groups, and would be very glad to obtain specimens.

ENTOMOLOGICAL NOTES.

BY DR. P. R. HOY, RACINE, WIS.

Racine, Wis., is situated on the west shore of Lake Michigan, at the southern extremity of the heavily timbered district, where the great prairies approach near the lake from the west. Latitude, 42° 46″ N.; longitude, 87° 48″ W.

This is rather a remarkable point for entomological, as well as ornithological collecting. Many insects usually found much further south, east of the great lakes, are met with here not unfrequently. A few such I here indicate :—

Nathalis iole *Bd.* Not abundant.
Callidryas eubule *L.* Common.
" philea *L.* 1883.
Terias nicippe *Cram.* Four specimens taken.
" mexicana *Bd.* One, 1883.
Junonia lavinia *Cram.* Common.
Argus labrusca *Hub.* Occasionally.
Dilophonota ello *Linn.* Not common.
Thysania zenobia *Cram.* Four specimens taken here.

CORRESPONDENCE.

Dear Sir : Prof. Kellicott's inquiry in Sept. number of the ENTOMOLOGIST as to whether *Thyridopteryx ephemeræformis* Haw. has been reported from Canada, leads me to make some explanations. Last Feb'y I visited Mr. Kellicott, taking a box of moths for identification. Among them was a pretty little moth with clear wings. The specimen was somewhat abraded. Mr. Kellicott pronounced it, provisionally, the male of the basket worm above named. On June 28th I captured another male specimen, and the next day I found a pair of the same insect copulating on a leaf of basswood. This last discovery precludes the idea of its being the basket worm of Haworth, for in my specimens both sexes are winged ; the female is thickly clothed and expands one inch ; the male has transparent wings and expands ¾ inch ; whereas in the true basket worm the female is wingless, cylindrical, and does not leave her case.

Packard says (Guide to Study of Insects, p. 289) :

" *Phobetrum* has narrow wings ; the male is very unlike the female, which has been raised by Mr. Trouvelot, and was *confounded by us* with *Thyridopteryx ephemeræformis* of Haworth. The wings of the male are partly transparent."

I have no doubt, therefore, that the insect in question is *Phobetrum pithecium* A. & S.

A. H. KILMAN, Ridgeway, Ont.

The Canadian Entomologist.

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ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the Society was held in London, at the Society's Rooms, Victoria Hall, on Wednesday, October 15th, 1884, at 7.30 o'clock, p. m.

The President, Mr. William Saunders, of London, Ont., in the chair.

Present: Mr. James Fletcher, Ottawa; Rev. Thos. W. Fyles, Quebec; Mr. J. Alston Moffat, Hamilton; Mr. John M. Denton, London; Mr. Wm. H. Harrington, Ottawa; Dr. Burgess, Mr. A. Puddicombe, Mr. H. B. Bock, Dr. Wolverton, Mr. L. B. Reed, and Mr. Chas. Chapman, of London; Mr. W. A. Macdonald, of the *Farmer's Advocate*, London, and the Sec.-Treas., Mr. E. Baynes Reed.

The minutes of the previous meeting were confirmed, the reading being dispensed with, as printed copies were in the hands of the members.

The President welcomed the members present, and expressed the regret they felt at the absence of some of those who in past years had attended the meetings, but were this year unavoidably absent, referring especially to Rev. C. J. S. Bethune, of Port Hope, and Mr. G. J. Bowles, of Montreal.

The Secretary presented the Report of the Council, embodying many of the results of the work of the Society for the past year, which will be published in the Annual Report.

The financial report of the Secretary-Treasurer was next read, showing a satisfactory condition of the funds. A report of the Librarian was also submitted, in which the additions to the library were enumerated, and a list given of the periodicals received in exchange for the CANADIAN ENTOMOLOGIST.

The report of the Montreal Branch of the Society was then presented, in which the work done by that energetic organization was referred to, presenting a gratifying exhibit highly creditable to the members comprising that branch.

Mr. Fletcher presented his report, read at the meeting of the Royal Society, as follows:—

REPORT OF THE DELEGATE OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO TO THE ROYAL SOCIETY OF CANADA.

It affords me much pleasure, as delegate from one of the societies honored with an invitation to send a representative to the meetings of the Royal Society of Canada, to report that during the past year the work of the Entomological Society of Ontario has been vigorously prosecuted, on the same plan as that heretofore followed, with satisfactory and evident results. The monthly organ of the Society, the CANADIAN ENTOMOLOGIST, has been regularly issued, its pages having been entirely filled with original contributions from members of the Society on scientific and practical Entomology. The volume which closed with the year 1883, No. XV., consisted of 246 pages, and contained a number of papers on descriptive Entomology, embracing descriptions of no less than 4 new genera and 67 species of insects new to science; also papers on practical Entomology, including life-histories of species, some of which have been minutely described in all their stages, and among them many injurious to agriculture.

With a view to popularize the science of Entomology, and to encourage beginners in the study, a special series of illustrated articles has been published, which we hope will have the effect of increasing the number of observers in this important branch of biology. To further this end, and to systematize the descrtptive work being done in such a manner as to secure uniformity in this department of research, the Council have prepared forms containing instructions for describing insects in their different stages.

There has also appeared during the year in the CANADIAN ENTOMOLOGIST much valuable information in reference to the geographical distribution of North American insects.

For the benefit of those interested in agriculture and horticulture, the Annual Report, which is always devoted to this practical aspect of the study, has recently been published, covering 83 pages, and embracing the Report of the Council, the Treasurer's Statement, the President's Inaugural Address, in which a review is given not only of the work of the Society during the year, but also of most of the important events of interest to

entomologists in North America, as well as popular articles giving descriptions of and remedies for such insect foes as may have been found particularly injurious to our forest trees and field crops.

In addition to this, a circular is being now prepared for circulation among the farmers and agriculturists of the Province, requesting them to report as promptly as possible on any insects which they may find injuring their crops, with a view to the suggestion of appropriate remedies.

The membership of the Society still increases and now stands at about 400, and we have on our roll members who are working for us in every province in the Dominion, as well as many of the leading entomologists in the United States. We have, however, to deplore, with the whole scientific world, the loss by death during the past year of some of our most active members. Of these special mention may be made of Prof. Croft, the founder of our Society, and Dr. J. L. LeConte, the celebrated Coleopterist.

The large collections of the Society have been further added to and the library considerably augmented, their usefulness for purposes of reference and study thus being much increased.

At the request of the Dominion Government, the Society undertook the preparation of a collection of specimens designed to illustrate insects injurious and beneficial to fish, to be exhibited in the International Fisheries Exhibition held last year in England. This collection, consisting of 40 cases, was prepared and sent forward to London, where it formed a most useful and attractive feature of the Canadian exhibit, and its merits were recognized by the award of a silver medal.

The Council of the Entomological Society of Ontario are glad to learn that the suggestions contained in their report to your honorable Society last year, with regard to increased facilities for the transmission of natural history specimens by mail, are, in response to a petition from the naturalists and students of science in Canada, receiving favorable consideration from the Hon. the Postmaster General, and they trust that the Royal Society of Canada will continue to use its influence in this direction on behalf of the students of natural history.

JAMES FLETCHER,, Delegate.

The President then delivered his annual address, as follows :—

ANNUAL ADDRESS OF THE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

Gentlemen : The working entomologist, ever on the watch and ready to note the many items of interest in connection with insect life, will seldom pass a season without finding many facts worthy of record, which if not of general interest, are at least of local importance. While the year 1884 has not been marked by any unusual invasion of destructive insects, affecting our country as a whole and exciting general comment, yet many localities have suffered, either from the unusual development of familiar forms of insect life, or from the introduction of new pests.

Early in the year some excitement was caused in the Ottawa district by the appearance of a very destructive caterpillar in great numbers in the clover fields, which rapidly devoured the foliage. This was at first supposed to be an invasion of the veritable army worm, but on inspection it proved to be a very different insect. On the 23rd of May I had the opportunity of examining some of the affected fields in company with our Vice-President and Mr. W. H. Harrington. The caterpillars were exceedingly numerous, and much of the clover had been seriously injured by them. They were a species of cut-worm, the progeny of a moth known as *Agrotis fennica.*

This larva measured from 1¼ to 1½ inches in length, had a dark yellowish brown head with a black stripe down the front, and a black body with two yellow stripes on each side, the upper one composed of streaks and dots of yellow, the lower, which was near the under surface, formed of two crinkled yellow lines which approached each other on the anterior segments and diverged posteriorly. On the upper part of the second segment was a black horny shield; the breathing holes on the sides were also surrounded with black.

The underside was brownish black, the feet and the fleshy pro-legs pale brown.

At the time of this visit the caterpillars were nearly full grown, and it was observed that many of them were affected by a singular disease of a fungoid character which was destroying them very rapidly, the diseased insects after death remaining extended on the leaves of clover or blades of grass in a natural position, but somewhat discolored. On handling them the skin was found to be quite tender and the body filled with a thin, dark-colored fluid, the result of the decomposition of the tissues. This

disease spread very rapidly, and was no doubt contagious. I collected some fifty or sixty specimens, all apparently in a healthy condition, for the purpose of rearing them. These were placed in two separate boxes with a liberal supply of food. Within twenty-four hours a large number of them died, all apparently from this disease; they were frequently examined, the diseased and dead were separated from the living, but within three days only four remained alive; of these four only one survived to enter the chrysalis state, and this one did not mature the perfect insect, hence I am indebted to Mr. James Fletcher for the determination of the insect, who, being on the spot, succeeded in rearing several specimens of the moth.

A few days later complaints were made to me of the depredations of the caterpillar of another of our cut-worms, a species usually very common, the larva of a moth known to entomologists as *Hadena arctica*, which was very destructive to corn and other crops. A few days sufficed to mature the swarms of both these devastating armies, when those caterpillars which had escaped both disease and enemies buried themselves in the ground and changed to chrysalids, which subsequently produced the winged moth.

Every season these cut-worms are a source of great annoyance to gardeners and farmers, who find their young corn, cabbages, tomatoes, melons and other plants of succulent growth suddenly cut down by an unseen enemy and withered. Stalks of wheat and other grain are often cut in a similar manner by the same enemies, and they being universally distributed and extremely voracious, inflict enormous losses every year. They have received the name of cut-worms from their habit of cutting off near the base tender and succulent plants, and under this common designation there are included a number of species having similar habits, belonging chiefly to the genera *Agrotis*, *Hadena* and *Mamestra*, some of which possess striking points of difference in the moth state, although they much resemble each other while in the caterpillar condition. The general history of these cut-worms can be given in a few words. The eggs are laid by the parent moths during the latter part of the summer, sometimes on the ground about the roots of grass and other plants, and sometimes on the leaves near the ground. Within two or three weeks young larvæ hatch from these eggs, and by the time autumn sets in the caterpillars have attained the length of half an inch or more, when they burrow into the ground deep enough to protect them from injury by

severe frost, and there remain in a torpid condition all the winter. The warmth of spring arouses them to activity, when they seek the surface of the ground, feeding at night on almost any green thing they meet with, eating with almost insatiable appetites as they approach maturity, and burying themselves during the day under the surface of the ground in the neighborhood of their depredations. When full grown they burrow in the earth to varying depths, and there change to chrysalids from which the mature insects escape in two or three weeks.

These insects are hurtful only while in the larval condition. As remedies, showering the plants with Paris green and water, sprinkling them with air-slacked lime or powdered hellebore, or strewing lime or soot, or mixtures of these substances around the plants on the surface of the ground, have all been recommended, and in some cases have been found useful. Plants have also been protected from injury by these caterpillars by strewing around them a little dry sand impregnated with coal oil, in the proportion of a teacupful of coal oil to a pailful of sand, thoroughly mixed; the application should be renewed every week. This method of warding off the attacks of injurious insects by the use of odorous substances repugnant to them, is rapidly growing in favor on account of the success attending its use. This coal oil remedy for cut-worms is said to be very effectual, and the cost of the application being so trifling, its usefulness should be extensively tested. It is manifest that none of these measures are feasible where field crops are invaded, as the area would be too great for any one to undertake to cover with such material. In such cases nature has provided efficient remedies to reduce the numbers of such injurious species. Besides the disease to which I have referred, there are armies of parasitic insects which prey on them. Some of these directly devour their living prey, others deposit eggs within the bodies of their victims, which hatching into grubs, consume them. Hence it often occurs that an insect which is very abundant one season is scarce the next.

These cut-worms are very widely disseminated. Early in July I received specimens from Manitoba from the Deputy Minister of Agriculture, of a caterpillar belonging to this group, which was found to be seriously injuring vegetables, and in some localities oats and barley also. This was a grayish-brown caterpillar with a semi-transparent skin, a brown horny head and a shield of the same character on the upper part of the second segment. There was a pale line down the back, two similar lines along each side, and a white band lower down, close to the under surface.

One of them was reared through all its stages, and produced a neat and rather pretty moth, known to entomologists as *Agrotis declarata*.

That destructive pest, the wheat midge, *Cecidomyia destructor*, which has entailed so much loss on our farmers in years gone by, has prevailed during the past season to a considerable extent throughout the western part of our Province. Alarming reports were sent to me from various districts, and on the 16th of July a tour of inspection was undertaken for the purpose of ascertaining the extent of the injury. During a drive of over 100 miles, in company with Mr. J. M. Denton, one of the members of our Council, the wheat fields were examined and midge was found generally distributed, but nowhere in any very great numbers. Some varieties of wheat were much more injured than others; that known under the names of Michigan Amber and Egyptian seemed to suffer much. Among the varieties almost free from this trouble the Democrat wheat was one of the most esteemed. The selection of some of the best of the so-called midge proof varieties for seed, the kernels of which harden so early in the season that the larva is unable to feed on them, is assuredly one of the most practicable methods of lessening the depredations of this troublesome insect.

The Colorado potato beetle, *Doryphora decemlineata*, is still further extending its ravages. Having reached the Atlantic seaboard in the east, its further progress in that direction has been arrested; it is now extending its domain over the fertile fields of the North-west. Specimens have been sent to me this season from Portage-la-Prairie, where they are said to be confined to the neighborhood of the town, and having been rigorously assailed with Paris green, it is hoped that they have been pretty well exterminated. Through the kindness of Acton Burrows, Esq., the efficient Deputy Minister of Agriculture in Manitoba, I have received information of the appearance of this pest in the counties of Manchester and Dufferin, in the same Province, but in none of these localities has the insect yet made much headway.

Grape growers in some sections of Ontario suffered much early in the season from injuries caused by the grape-vine flea-beetle, *Graptodera chalybea*. This insect, which is about three-twentieths of an inch long and varies in color from a steel blue to green, passes the winter in the perfect state, hybernating under dead leaves and other rubbish, and awaking from its long slumber in early spring, proceeds to satisfy its vigorous

appetite by consuming the tender buds of the grape-vine, just as they are swelling. These insects have been so plentiful in some vineyards that the crop has been almost destroyed. Where they prove troublesome they may be collected by spreading sheets on the ground under the vines and jarring the canes early in the morning when the beetles are in a torpid condition, or they may be poisoned by syringing the swelling buds with Paris green and water.

The plum curculio, *Conotrachelus nenuphar*, continues its mischievous work in most parts of the Province where plums are grown, and the labor attending the jarring of the trees for the purpose of capturing and killing the insects deters many from undertaking the cultivation of this useful fruit. From the evidence thus far obtained it would appear that the remedy which has been found so efficacious in subduing the codling moth of the apple, namely, Paris green and water in the proportion of a teaspoonful of the poison to a pailful of water, will also protect the plum crop from the ravages of curculio. This remedy should be extensively tried by thoroughly syringing the trees with it as soon as the fruit has set, and repeating the application in a few days should rain occur to wash it off. Should this remedy prove uniformly successful a great stimulus will be given to plum culture. During the past season the plum crop on my own grounds was a failure, the trees having had but very few blossoms. In the absence of plums the curculios deposited their eggs freely on the pears, manifesting a special fondness for Clapp's Favorite. Although I watched them carefully, I failed to find a single example where the insect matured in this fruit. The only effect observed was a slight disfigurement in the form of the fruit and the production of a hard spot where the incision was made. While collecting moths at sugar early in the season, I observed one evening about nine o'clock, among the insects which came to sip the sweets, two specimens of the plum curculio. I captured one of them, the other fell to the ground before I could secure it. Experiments made by me some years ago proved that this insect is active at night as well as in daylight, but this is the only instance I have known of its being attracted to sugar at night.

From one locality complaints reached me about the middle of June last of the abundance of a spiny caterpillar feeding on currant bushes, which my correspondent supposed to be a new currant worm. Specimens were forwarded and proved to be the caterpillar of the gray Comma butterfly, *Grapta progne*. This insect may be found almost every season in

limited numbers on the wild gooseberry and currant bushes in open woods, and occasionally on the cultivated varieties, but this is the first instance to my knowledge where the insect has appeared in sufficient numbers to cause injury. They are so very subject to parasites that it is not at all likely they will ever prove generally destructive ; syringing the bushes with Paris green and water, or dusting the foliage with powdered hellebore, will soon make an end of them.

In the neighborhood of Drummondville several acres of red raspberries were stripped of their foliage by the larva of the raspberry sawfly, *Selandria rubi;* reports of injury from this pest have also been received from several other localities. It is a green worm which is so exactly of the color of the young foliage it feeds on that it frequently escapes detection. When examined this larva is found to much resemble that well known pest, the currant worm, but it has no black dots. If allowed to pursue their course they soon riddle the leaves, leaving little more than a net-work of the coarser veins. An application of hellebore mixed with water, in the proportion of an ounce of the powder to a pailful of water, speedily destroys them.

A new clover insect has recently invaded our Province which promises to be troublesome. It is a small curculio known to entomolgists as the punctured clover-leaf weevil, *Phytonomus punctatus.* It is said to have been introduced from Europe within the past few years. The late Dr. LeConte, in a work published in 1876, reports having received one specimen from Canada, but at that time nothing seemed to have been known of its habits. In 1881 Prof. Riley published in the *American Naturalist*, an account of the injury done to clover fields in Yates county, New York, by this insect ; in one instance in a patch of two acres scarcely a whole leaf remained. The beetle is about two-fifths of an inch long, of a dark brown color, marked with dull yellow, and has its wing cases thickly punctured. Each female is said to deposit from 200 to 300 eggs, which are sometimes laid on the surface of the leaf stem, but more frequently thrust into the interior of the older stems. The young larvæ may be found as early as in May, but being small they do not usually attract notice until almost a month later. At first they feed among the folded young leaves or attached to the under side of a leaf. When approaching full growth they feed chiefly on the margins of the leaves, into which they eat irregular holes. At this period they are not easily seen, as they relax their hold and drop suddenly to the ground when approached ; moreover, they feed

chiefly during the night and hide in the day time among the roots and stalks of the plants. When full grown the larva spins a small cocoon, which is usually placed a little below the surface of the ground, in which it changes to a chrysalis: about three weeks later the beetle escapes. From observations which have been made on this insect at the Department of Agriculture, in Washington, the average period required from the time of the depositing of the egg to the escape of the mature beetle is three and one-third months, hence in most localities there will be two broods during the summer. Mr. A. H. Kilman, one of our members residing in Ridgeway, was the first to report the occurrence of this pest in Ontario, which he says was wafted to our shores by prevailing east winds, about the 10th of August last. On this date the beetles appeared on the opposite side of Lake Erie, in Buffalo, in such multitudes that thousands of them were crushed on the pavements by the feet of passers by. Mr. Kilman says: "I picked them from the fences and sidewalks, and found them in the grass in my lawn; I am of opinion that they will go into winter quarters here and open up a lively campaign in the spring. Whatever the sequel may show, I fear these invaders will prove of better staying qualities than those who crossed the border in '66, and turned to the right about at Ridgeway because Canada was not the 'clover patch' they were looking for."

As the larvæ will be found most numerous in the latter part of May or early in June, it is recommended that the clover should be heavily rolled at that time for the purpose of destroying them. If badly infested fields were ploughed about this period, the destruction of the insects would be still more certain.

Early in the summer alarming accounts were received of another insect injuring the maple trees, especially the shade trees on streets and avenues. This was a species of Coccus or bark-louse, *Pulvinaria innumerabilis*, which forms brown scales on the branches, from under one end of which there protrudes a cotton-like substance, forming a tuft about four times as large as the scale in which the eggs of the insect are lodged. In a short time there issues from this egg-nest a multitude of minute yellowish white lice which distribute themselves over the branches, and locating on the succulent portions, pierce the tender bark with their sharp beaks and subsist upon the sap. These young lice soon become stationary, gradually increase in size

and reach maturity towards the end of the season. They chiefly affect the underside of the limbs and branches.

Remedies.—The branches may be rubbed with a stiff brush or broom, which will dislodge many of the insects, and then washed with a liquid made of soap diluted with lye or solution of washing soda, or with an emulsion of coal oil made as follows: Take one pint of coal oil and agitate vigorously with an equal quantity of milk until the compound assumes a creamy appearance, when it should be diluted with about ten times its bulk of water and applied with a brush or syringe.

This pest has occured in many localities in Western Ontario, also in Michigan, New York and Pennsylvania.

That cosmopolitan butterfly known as the painted lady, *Pyrameis cardui*, has been very abundant the past summer, not only in Canada, but also in most of the Northern United States. From Mr. Burrows I learn that in Manitoba the larvæ appeared in such countless hosts as to cause much alarm, and reports were current of their having injured some of the growing crops. This, however, is improbable, as it devotes its attention mainly to devouring thistles. Occasionally specimens have been found feeding on mallow, hollyhock, wild sunflower, burdock, and several other plants, none of which, however, are of any economic value.

A lively interest is being awakened in reference to the insects inhabiting our Northwest Territories and British Columbia, of which we as yet know comparatively little. Captain Gamble Geddes, of Toronto, has made excursions to several of these distant points and brought home many rarities. From the Moose Mountain district in the Province of Assinaboia, a number of interesting specimens have been received, collected by Miss F. M. Pierce. Prof. Panton, of Winnipeg, has been collecting in that neighborhood, and in British Columbia we have a most efficient helper in the person of Mr. G. W. Taylor, who has recently published in the Canadian Entomologist, lists of some of his captures in the neighborhood of Victoria. It is sincerely hoped that other observers will be induced to labor in these most interesting and promising fields.

On the 30th of January last, the House of Commons at Ottawa resolved to appoint a select committee to inquire into the best means of encouraging and developing the agricultural industries of Canada. Circulars were prepared by the committee embracing a series of questions which were sent to most of the prominent agriculturists and scientific men in the Dominion, to which several hundred replies were received. The

practical bearing of entomology on agriculture was fully recognised by the committee, and the questions so framed that a very large amount of information on this subject was gathered. Our Vice-President, Mr. James Fletcher, was summoned to give evidence in reference to injurious and friendly insects; so also was Mr. W. H. Harrington. A report has been issued covering 218 pages, containing the evidence and a summary of the replies to the questions. It is gratifying to find that the close relationship between entomology and successful agriculture is beginning to be more fully realized, and that the work of our Society and the efforts of entomologists generally are so well spoken of as they are in this document.

Continued efforts are being made by our Society to obtain and disseminate correct information, especially in reference to those insects injurious to agriculture. With this in view we have lately issued a number of blank forms for describing insects, which will be sent to any one desiring them on application to either of the officers in London. By this means we hope to secure fuller details and more uniform descriptions of insect pests, so that they may be more readily determined. The officers and members of the Council have also embraced every opportunity afforded them of visiting localities affected by destructive insects, and have endeavored to disseminate among the sufferers practical information in regard to the most effective remedies for such evils. The demand for our Annual Reports from all parts of the world has much increased since the publication last year of the general index. It is a matter of regret that the issue of several of the earlier reports is entirely exhausted, and there is now no means of supplying the demand. Our monthly journal, now in the sixteenth year of its existence, continues also to grow in public favor.

During the past year reports of great value in reference to destructive insects have been published by the Department of Agriculture, at Washington, under the able direction of Prof. C. V. Riley. A most excellent and voluminous report from the pen of Prof. J. A. Lintner, State Entomologist, has been printed and distributed by the State of New York. Much useful work has also been accomplished in the same direction by Prof. A. S. Forbes, State Entomologist of Illinois; by Prof. Herbert Osborn, of the Iowa Agricultural College, and others. Many additional parts have appeared of that superbly illustrated work on North American Butterflies, by Mr. W. H. Edwards; the same talented author has also now in the press a revised catalogue of the butterflies of North America. The recent meeting of the Entomological Club of the American Associa-

tion for the Advancement of Science, held in Philadelphia, was one of unusual interest, most of the leading entomologists on this continent being present. A full report of the proceedings has been prepared.

In concluding, permit me to urge upon you all renewed diligence in your studies of insect life ; be patient and faithful in observing, be prompt in publishing the results of your observations. The field we labor in is so vast that life is too short to permit any one of us to do much, especially when the limited time is taxed by other pressing engagements. Nevertheless, let us do what we can to unravel the mysteries relating to these much-despised atoms of existence ; the opportunity is ever before us.

> "Ten thousand forms, ten thousand different tribes,
> People the blaze of day."

And when the brightness of the sunshine has faded, there are tribes equally numerous and attractive which rise not from their couch until their more obtrusive brethren have retired to rest. Whether it is ours to employ portions of the night or the day in this charming occupation, we shall not in either case fail to find manifested in beauty of form and in the instincts with which these tiny creatures are endowed manifold evidence of the wisdom and goodness of the great Author of Life.

ELECTION OF OFFICERS.

The following named gentlemen were then duly elected as officers of the Society for the ensuing year :

President, William Saunders, London, Ont.

Vice-President, James Fletcher, Ottawa, Ont.

Secretary-Treasurer and Librarian, E. Baynes Reed, London, Ont.

Council : Rev. C. J. S. Bethune, M. A., Port Hope ; Rev. J. W. Fyles, South Quebec ; W. H. Harrington, Ottawa ; J. M. Denton, London ; J. Alston Moffat, Hamilton.

Editor "Canadian Entomologist," William Saunders, London.

Editing Committee, Rev. C. J. S. Bethune, J. M. Denton, James Fletcher, and E. Baynes Reed.

Auditors, W. E. Saunders, H. P. Bock.

Delegate to "Royal Society," W. H. Harrington.

DISCUSSION.

On motion of Mr. James Fletcher, seconded by Rev. J. W. Fyles, a vote of thanks was unanimously tendered to the President, Mr. Wm. Saunders, for his able and interesting address.

In proposing this vote, Mr. Fletcher said that he should like to make a few remarks concerning some of the subjects alluded to in the address, particularly with regard to the cut-worms referred to in the earlier part, which he had especially investigated by instruction of the President, and upon the occurrence of which he had prepared a short note for the Society. He stated that the injury done by *Agrotis fennica* at Ottawa, in the month of May last, was very great. He had received reports of its ravages early in the month, and in all cases those inquiring for remedies stated that the insects were new to them. The first specimens sent were taken in large numbers under strawberry plants, and were about half an inch in length. After a few days reports came in *from all quarters, of their devastation*, which was worst about the 22nd May, when, the President being in Ottawa, he had, together with Mr. Harrington and himself, visited one of the most seriously injured farms two miles from Ottawa, where they had found the larvæ in vast numbers attacking the clover in a field of fodder, but leaving untouched the rye which was growing with it. At first it was supposed by the farmers that the insect was the Army Worm, but the larva upon examination was found to be quite different, being of a deep velvety black with indistinct white lines. It was found to be chiefly nocturnal in its habits, and to possess characteristics of the ordinary cut-worms, lying hid beneath the surface during the day, and destroying everything within its reach at night. They were also climbing cut-worms, and had done much damage by eating out the leading shoots in some young trees Mr. Fletcher was growing from the seed for examination; oak, black walnut, horse chestnut, elm, negundo and maple, all had suffered. It seemed that during the last stage the larvæ were much more active during the day time, and did not hide under the surface. Just before the pupal stage an enormous fatality was caused by a fungus disease which attacked the larvæ and which caused them to decay very rapidly. In certain fields they could be seen in large numbers on the stems of grass and other plants which they had crawled up, and to which they were fixed by the fungus which seemed in nearly all cases to develop just below the head in the shape of a small tuft of white downy matter; after a short time the bodies dried up. Large numbers had also fallen a prey to parasites, and as many as three ovæ of a *Tachnia* fly had been found on some specimens. Mr. Fletcher had only succeeded in rearing about a dozen imagines, nor had the moth been very common during the summer, although a few had been taken.

With reference to the Manitoba cut-worm, referred to by Mr. Saunders, he had succeeded in bringing to chrysalis three of the four larvæ sent to him by Mr. Acton Burrows, the Deputy Minister of Agriculture for Manitoba: of these when the moth emerged one proved to be *Agrotis devastator*, and the other two had been sent to Mr. J. B. Smyth, of New York, for identification. They were very dissimilar in color, but the markings seemed to be the same on each.

Mr. Fletcher also stated that during the month of July he had found a small *Phytonomus* committing great damage in the clover at Dalhousie, New Brunswick.

He had taken it for *P. nigrirostris* at first, but fancied it might be a different species, as nearly all the specimens bred were light cinnamon brown in color*.

He found that its habits differed considerably from those of *P. punctatus* as described in Prof. Lintner's first report. He had brought specimens for the members, and as he had prepared a note of the insect for the Society he would not say more then. He had found a cocoon on clover at Brome, in the Eastern Townships.

Mr. J. Alston Moffat here exhibited specimens of the true *P. punctatus* which he had received from Mr. Kilman, Ridgeway. Resuming his remarks, Mr. Fletcher said that he had obseved enormous damage done by the Larch saw fly, *Nematus Erichsonii;* he had first noticed it near Quebec, and had traced it all down the Intercolonial Railway, wherever any Larch trees occurred, as far as Dalhousie, where he found it abundant. He exhibited interesting specimens of young twigs of *Larix Americana* which he had received the previous week from the Rev. Mr. Fyles, from Quebec, in which the leaves of the tree, although eaten down to the base by the larvæ, had later in the season, after the attack ceased, been able to grow about a quarter of an inch. Mr. Fletcher thought that this fact, that the tree was able to produce this after-crop of foliage, was one of very great importance, as the tree might by this means be able to withstand the insect for a much longer period; he anticipated that some remedy, either artificial or natural, would be found before long.

He exhibited a small Homopteron, *Podisus modestus*, which he had found destroying the larvæ at Brome, P. Q., on the estate of S. A. Fisher,

* Since identified as *Phytonomus nigrirostris*.

Esq., M. P., who had given him assistance, and provided him with facilities for examining this pest.

The Rev. T. W. Fyles, of South Quebec, said it afforded him much pleasure to second the vote of thanks to their President. Referring to the fungous disease upon the cut-worms mentioned by Mr. Fletcher, he said that he had known in England many years ago of an insect similar to this being attacked by some such disease as had been described. He spoke of the habits of cut-worms, saying that as they did not tunnel their way from plant to plant, but passed over the surface, a circle of salt placed round each plant at a short distance would probably save it; the larvæ would shun the salt. Besides this there was the remedy of "hilling up" the plant; he had found that the larvæ would not climb a mound on account of the particles of earth giving way. He believed that salt in the early stages of the plants and the mounds of earth afterwards, would amply protect corn, etc., from the attacks of the insects.

He next spoke of the potato beetle, *D. decem-lineata*, and expressed his belief that its numbers and vigor were decreasing in the Province of Quebec. He stated that there were places on the Lower St. Lawrence where it had not appeared.

He next remarked that *Nematus Erichsonii*, the Larch saw-fly, had extended its ravages along the Beauce Valley to the neighborhood of Quebec, where it had stripped the tamaracks (larch) bare. A second growth of leaves had appeared, and this probably would save the trees. If, however, the attacks were repeated to the same extent, he believed the trees would die. Mr. Fyles showed specimens of the insect and of its cocoons.

Mr. J. Alston Moffat, of Hamilton, stated that he had lately received from his friend, Mr. J. B. Hay, of Brantford, some specimens of a beetle that had been found attacking hot-house plants, *Abutilon*, *Roses*, *Plumbago*, etc. The insect being new to him he sent it to Dr. Horn for identification, and received the follow letter from him :—

Philadelphia, Pa., Oct. 10th, 1884.

Dear Sir : The insect you send is *Aramiges Fulleri* Horn. (Fuller's rose beetle). It is widely scattered over the country, and has been reported to me as damaging many hot-house plants, particularly the thick leaved varieties. It seems a great nuisance, and eight years ago appeared to be rare. G. H. Horn.

Specimens of this insect were exhibited by Mr. Moffat.

The President, in referring to the work of the special committee appointed by the House of Commons in February last to inquire into the condition of agriculture, said that the members would be much pleased to learn that as one of the results of that inquiry, Mr. Fletcher had been appointed Honorary Entomologist to the Dominion Department of Agriculture. It was much to be desired that this appointment should become permanent, for the Society cordially recognized the special fitness of Mr. Fletcher for this important position, and believed that he would accomplish much good work in this connection.

Mr. Reed exhibited a colored photograph presented to the Society by Mr. Alfred Wailly, an English member of the Society, representing an extraordinary aberrant form of *Attacus cecropia*.

Mr. Fletcher stated that he was happy to announce that during the past summer, under instructions from Dr. Selwyn, F. R. S., Director of the Geological Survey of Canada, an interesting collection of Lepidoptera had been made in the Lake Nepigon region by Prof. Macoun and Mr. William Macoun, and that these having been submitted to him for identification, he had found many very valuable insects, included among which he made special mention of two species of *Chionobas*, *Colias eurytheme*, *Colias interior*, a species of *Chrysophanus*, which was possibly new, and *Alypia MacCullochii*. By means of these instructions to the surveyors it was hoped that much useful information would be obtained of the insect fauna of these newer parts of the Dominion that were being explored and opened up for occupation.

Mr. Fletcher remarked that we have heard a good deal of rubbish in the newspapers, etc., about nothing being done by the members of the Geological Survey. He hoped that it was unnecessary to say that these reports were entirely without foundation, and, at any rate, the present action of the Director would prove to all entomologists that he appreciated the value of their scientific researches.

The evening being somewhat advanced the Society adjourned until 9 o'clock next morning.

Thursday Morning, October 16.

The Society re-assembled at their rooms at 9.30. The President in the chair.

Mr. W. H. Harrington stated that *Phytonomus nigricornis* occurred in considerable numbers in the vicinity of Ottawa, but that he had not

found any evidences of the destructive habits described by Mr. Fletcher. It was, however, known to attack clover in Europe.

He mentioned several insects found by him on Larch, such as *Urocerus flavicornis* and *Buprestis maculiventris*. During the previous summer he had, in company with Mr. Fletcher, noticed a grove of tamarac with trees in various stages of health and decay, and the cause of the latter seemed undoubtedly to be a species of *Dendroctonus*, which was found in immense numbers under the bark of sickly and dying trees. The bark was completely undermined and riddled by its galleries, and swarmed with larvæ pupæ and beetles. Associated with them were large numbers of a smaller bark-borer, *Hylesinus opaculus*, with one or two other species, which would not be likely, from their habits or numbers, to do much injury. Examination of dead trees showed that the bark had been destroyed in the same manner, but now contained no beetles.

In reply to a question as to whether such bark beetles ever attacked living and healthy trees, Mr. Harrington answered in the affirmative, and instanced a species which he had during the spring found boring into and through the terminal buds of *Pinus strobus* (white pine) and thus destroying them.

EXHIBITION OF INSECTS.

Mr. Harrington exhibited a small collection of about 50 species of Coleoptera taken by him at Sydney, Cape Breton, during a visit of a few days in September, also specimens of the Chinch bug which he had found abundant there ; he also exhibited a *Chalcophora liberta*, with deformed thorax, a *Trogosita mauritanica*, with deformed head, and a wasp (Vespa?) with one of its antennæ curiously deformed.

Rev. T. W. Fyles showed specimens of *Colias eurytheme*, *Pieris Manitoba*, *P. centaureæ*, a female of *Smerinthus cerysii*, and other rare insects.

Mr. J. Alston Moffat showed a collection of rare and interesting insects, both Lepidoptera and Coleoptera.

Mr. Fletcher exhibited a collection of 40 specimens of *Colias philodice*, showing many curious varieties. Two specimens of *Colias eurytheme*, one of which was the autumn form bred from the egg. Two specimens of a small moth bred from larvæ found boring in the flowers and capsules of *Nelumbium luteum* at Chicago. A specimen of *Sphinx luscitiosa*. A *Hepialus* taken at Dalhousie, N. B., very similar to *H.*

argenteo-maculata, but smaller, and having 4 spots on the primaries. Two specimens of a *Chrysophanus*, taken by Mr. A. Macoun, at Nepigon. Specimens of *Agrotis fennica*, and other rare Lepidoptera taken during the past season.

Rev. T. W. Fyles exhibited specimens of mud wasps' nests, taken at Compton, from which he had obtained grubs that produced a species of Ptinidæ.

Mr. J. M. Denton showed some Philadelphia raspberry canes which were badly injured by some borer not determined.

The President exhibited two boxes of insects which had been lately received from Miss F. M. Pierce, of Moose Mountain, Assinaboia, who had sent the specimens as a first collection. The boxes proved of great interest to the members present.

The Secretary exhibited the beautiful silver medal which had been awarded to the Society by the International Fisheries Exhibition. The medal was much admired.

In presenting a collection of diurnal Lepidoptera from Mr. S. W. Taylor, of Victoria, Vancouver Island, Mr. Fletcher stated that he considered one of the chief advantages of having the annual meeting at London was that the members could see in what species the Society's reference collection was deficient, and he was sure that they all felt the necessity of making the collection as complete as possible. For his own part, he would much prefer giving any unique specimens he might take to the Society, rather than have them hidden away in his own collection where only a few could see them. He had now very much pleasure in presenting a small but valuable collection of specimens to the Society from his friend, Mr. S. W. Taylor, of Victoria, B. C. Mr. Taylor, although one of our new members, had already done good work. Mr. Fletcher also distributed among the members a packet of duplicates, sent for that purpose by Mr. Taylor, among which were specimens of a *Melitæa* provisionally named *rubicunda*, but which were not considered typical by Mr. W. H. Edwards; of this species, however, Mr. Fletcher had received larvæ, some of which were in his own hands, and some had been forwarded to Mr. W. H. Edwards.

The President expressed the pleasure Mr. Taylor's liberality had given him and the gratification he felt that the Society's collections were so much appreciated; a vote of thanks was given to Mr. Taylor for his donation.

Mr. Harrington stated that *Oberea tripunctata* had been found very abundant at Ottawa. He remembered it also as being general in 1873.

Mr. Reed called attention to an extract from a newspaper showing that railroad cars may often be the vehicles of carrying destructive moths from one part of the country to another. The extract stated that the writer was often struck by the number of "*Aletiæ*" on the trains, and that he had observed that there was a sort of coincidence last season between lines of railroad and abundance of cotton worms.

Mr. Reed said that he had noticed fewer specimens of *Aletia* this year than for some seasons past, although a few had within a few days been caught in his residence.

Mr. Reed also said that *Aegeria acerni* had been very prevalent in the neighborhood of London this season.

Rev. Mr. Fyles reported that *Aegeria tricincta* had been taken at Como, P. Q., and also that he had taken two larvæ of *P. satellitia*.

Mr. Fletcher showed an aberrant specimen of *Notodonta americana* that had emerged from basswood in autumn instead of spring; he also reported the capture at Ottawa of *Ellema Harrisii*.

An interesting discussion then took place on the transmission of insects through the mail, and the best method of relaxing specimens.

In answer to Rev. Mr. Fyles, Mr. Fletcher said that we had not in Canada any plant which could be used as a substitute for the Laurel so extensively used by European entomologists, not only for killing the insects, but for keeping them for a long time in a relaxed condition without spoiling. He had tried the young leaves of some of the different species of wild cherry, which contain prussic acid; but had found that although it killed the insects, it soon became mouldy.

Mr. Reed had found moist sand an excellent means of relaxing Lepidoptera, and boiling water for Coleoptera.

The meeting finally passed a resolution requesting Mr. J. Fletcher to prepare for the use of the members a short circular giving instructions for relaxing specimens, and also the best plan of packing them for transmission through the mail.

This Mr. Fletcher undertook to do, remarking that he himself had found the process of nature-printing a very useful mode of sending Lepidoptera for identification.

(To be Continued.)

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NOTES ON LARVA OF EUCHAETES EGLE, Clem.

BY G. H. FRENCH, CARBONDALE, ILL.

On July 5th, 1884, several larvæ of this species were handed me by a neighbor, who had found them feeding on *Asclepias quadrifolia* growing in the yard. They were just ready to pass the last moult, evidently leaving the plant for the purpose of moulting; some of them being found on a fence attracted the notice of the person finding them. As found they were .55 of an inch long; body brownish black, each joint with eight tubercles from which project tufts of hairs. Those from the four dorsal, on joints 2 and 3, are long and black, part of those on joint 4 are white; the posterior three joints also supporting long tufts. The dorsal tufts between these are ochre colored, about a third as long as the anterior or posterior, and bend towards the centre from each side. The lower tufts on the anterior part of the body are gray, the rest black. Head black.

July 8, 9 and 10 quite a number more were found; both they, and those in my breeding case, had moulted and returned to the food plant. They must have gone quite a distance from the plant, as the fence and other things for several feet around were carefully examined upon finding the first, but only three or four were left feeding on the plants.

At this time they were .80 of an inch long; body velvety black, each joint with ten tubercles, from each of which arises a spreading cluster of hairs. Besides these, on the dorsal tubercles of joints 3 to 5 and 12 and 13, are pencils of finer hairs .25 of an inch long. All the hairs on joint 2 are white, short and point forward. In some specimens part of the dorsal pencils on joints 3 and 5 are white; also part of the hairs on joint 12 white, in others all are black. The dorsal pairs of tufts on joints 6 to 11 are turned towards each other so as to make a complete ridge, the others on the sides point outward. The pencils on joints 6 to 11 are about .15 of an inch long. Those on the back have the centre hairs ochre with black underneath; the laterals are black. Each one of the long hairs

under the glass is seen to be covered with a soft pubescence that makes it more like a downy feather than a hair. Head jet black, base of clypeus and antennæ white; tips of prolegs pale.

On most of the specimens the lower spreading tufts of hairs on the extremities of the body are white, the rest black; but I find some with all the lateral spreading hairs white, and also the lateral pencils on joints 6 to 11. In others the spreading hairs are gray and the lateral pencils black; but these variations are the exception. Each tubercle gives rise to two sets of hairs, a short spreading bristle-like set, and in the centre a pencil of the plumose sort.

July 11 they began to spin, and by the 16th all had disappeared. They produced the imagines from July 28th to 31st, 54 coming out in all, only 6 of which were ♀. Some of the females deposited eggs, which were .025 of an inch in diameter, globular, white, smooth. These were deposited in irregular clusters, some in the roof of the cage and some partly around a twig, but all of them were covered more or less completely by hairs from the last joint of the abdomen of the female. The tufts of whitish hairs found on the tip of the abdomen of this species seems to be for that purpose. After the cluster was completed the female would rub the end of the abdomen all around it and over it, nearly denuding herself of these hairs.

These eggs were watched for a number of days, but as they did not hatch they were not noticed further, it being supposed that they would hibernate. Afterwards it was found they had hatched and the larvæ died. While in confinement the larvæ were fed on *Asclepias tuberosa*, which they ate readily, but they refused to eat *A. purpurascens*.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

(Continued from page 220.)

PAPERS READ.

The Rev. Mr. Fyles read a paper describing the habits of an insect forming galls upon *Vaccinium canadense*, and exhibited specimens and microscopic drawings of the insect.

Mr. Harrington read an abstract of a paper on the Tenthredinidæ, or saw-flies.

Mr. Fletcher gave an abstract of a paper he had prepared detailing some experiments he had made in breeding some Coliads from the egg. He said he thought that the thanks of the Society were especially due to Mr. W. H. Edwards for his most valuable papers published in the CANADIAN ENTOMOLOGIST during the past year, and he was of opinion that they could not fail to have important results. Having been induced himself by these articles to take up this fascinating branch of entomology, the results had been such that he considered them worthy to bring before the members at this meeting. He had been fortunate enough to secure a very much worn female of *Colias eurytheme*, summer form *eurytheme*, from which he had succeeded in breeding a lovely female specimen of the autumn form, *keewaydin*. Thinking it would be interesting to compare the larvæ stage by stage with *C. philodice*, he had obtained twelve eggs of that species from a typically marked yellow female, on the same day as the eggs of *C. eurytheme* were laid, and he gave a short account of the differences noted between these larvæ at the different moults, and exhibited a beautiful series of specimens of *C. philodice*, drawing attention to the different variations in the markings. The brood of twelve bred at the same time as *C. eurytheme*, were very interesting, consisting of three males, four ordinary yellow females, three albino females, and one yellow female with very dull markings ; one larva was destroyed by the larva of a Tachina fly.

Rev. Mr. Fyles read an interesting paper on the Neuroptera and their relation to the fishing interests.

Also a paper on the occurrence in the Province of Quebec of the Croton Bug, *Ectobia germanica*.

The President then read an interesting paper by Mr. G. J. Bowles, on ants.

The meeting decided that these papers should be submitted for insertion in the Annual Report.

Mr. W. A. Macdonald, agricultural editor of the *Farmer's Advocate*, took the opportunity of expressing the pleasure he had derived from listening to the interesting discussions which had taken place during the meetings, and to the vast amount of information thus given. He had found these meetings so profitable that he hoped to have the pleasure of attending them another year. The Entomological Society of Ontario, he said, was doing a good work in gathering and distributing information in

reference to the many insect pests which our farmers and fruit growers have to fight with, and he should be glad to render it any assistance in his power.

The meeting then adjourned.

LIST OF DIURNAL LEPIDOPTERA TAKEN IN THE NORTH-WEST AND ROCKY MTS., SEASON OF 1884, WITH LOCALITIES.

BY CAPT. GAMBLE GEDDES, A. D. C., GOVERNMENT HOUSE, TORONTO.

107. Colias Meadii, Edw.; Laggan, C. P. R.
108. " interior, Scud.; Stephen, C. P. R.
109. Anthocaris hyantis, Edw. Kicking Horse Lake.
110. Argynnis triclaris, Hüb. ; Mount Lefroy.
111. Melitæa Geddesii, Edw. (nov. spec.) Canmore.
112. Phyciodes pratensis, Behr. ; Kicking Horse Pass.
113. Grapta zephyrus, Edw.; Laggan, Summit.
114. Chionobas jutta, Hüb.; Emerald Lake.
115. Chrysophanus dione, Scud.; Calgary, N. W. T.
116. Lycæna shasta, Edw.; Laggan, Rocky Mts.
117. " lycea, Edw.; Stephen, Rocky Mts.
118. " orbitulus, V. Prun.; Canmore.
119. " evius, Bd.; Castle Mountain.
120. Thymelicus hylax, Edw.; Laggan.
121. Euptoieta claudia, Cram.; Calgary.
122. Grapta J-album, Bd.; Kicking Horse Lake.

These species are in addition to the list published last season, and will add considerably to the Catalogue of Br. American specimens already known ; several of them have never been taken in Canada before.

Capt. Geddes will also publish a list of Heterocera taken in 1883-4, as well as Coleoptera, Neuroptera, Hymenoptera and Diptera, and, if possible, Orthoptera. This, it is hoped, will prove a useful guide to collectors in the North-West. A list of Micro-Lepidoptera will also shortly appear in the ENTOMOLOGIST.

NOTE ON CHALCOGRAPHA SCALARIS, LeConte.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

I may give an addition to my note (June, No. 6, p. 120, 1884). During the last seventeen years this beetle has never been rare in Cambridge, Mass., but never so overwhelmingly common as this year. As this elegant beetle was the first I had collected here in October, 1867, it had become my pet, and I paid some attention to it every year. This year it was very common on a long board fence in Ware St., which I have to pass four times every day. The fence surrounds a large garden with many elm trees near. When I heard that the beetle had been very destructive to elm trees in some places on the north side of the College grounds, and that it had nearly denuded some trees in Sommerville, I gave closer attention to it. Till June the leaves of the elms in Ware St. were comparatively uninjured. Then appeared the second brood of larvæ, and very soon the leaves were honeycombed with more or less round holes, and turned yellow prematurely. The larvæ were first described by Harris, Injur. Ins., 1841, and the same repeated in all following editions; the edition of 1862 gives a figure of the larva and beetles. A new and fuller description of the egg, larva and pupa is given by Dr. A. S. Packard, Insects Injurious to Forest and Shade Trees, 1881, p. 126. Harris says, Injurious Insects, 1862, p. 133, these beetles inhabit the linden and the elm. A. Fitch, Report V., p. 842, records them as injurious to the elm; common also upon willows. Packard, 1881, observed them very abundant at Brunswick, Maine. The numerous linden trees in the campus of Bowdoin College were infested to such a degree that nearly every tree, and in some cases nearly every leaf of a tree, was infested by the grubs. Packard, in Maine, had taken the beetle in coitu on the alder, where it is more common. I find no enemies mentioned, but I observed myself in August a nymph of *Podacrys spinosus*, after Mr. Uhler's determination, running after a young larva and spearing it dexterously through the anus. When I took both in a small box, they separated directly, but in opening the box ten minutes later, I found the larva again safely speared. The distribution of *C. scalaris* is very large; the Museum contains the imago and larva from the Saskatchewan River, Brit. Am., and from Lake Superior. It goes down through the Eastern and Middle States to Louisiana and Mexico, to Costa Rica (of Suffrian Stett. Ent. Zeit. 1858, p. 256). Westerly, Rogers (Proc. Ac. N. S. Phil., vol. 8, p. 32) quotes Nebraska.

Dr. Horn, CAN. ENT., 1884, p. 127, states why the name *Chrysomela scalaris*, given to the beetle, Ann. Lyceum N. H. 1824, vol. 1, p. 173, pl. 7, f. 18, was changed by Stal, Monogr. p. 261, in *Chr. multiguttis*, because Olivier had described in 1807 a *Chr. scalaris*. But as this species belongs to *Doryphora*, and LeConte's species to *Chalcographa*, this latter name can stand, and is in fact accepted by Jacoby, Biol. Cent. Am. vi., pl. i., p. 197, pl. xl., f. 6. Mr. Jacoby says: "A specimen from the collection of Sturm is labeled by him *C. rufipes*." The synonym of *C. lateralis* St. given in Gemminger's Catalogue must therefore refer to another species. But there is in Sturm's Catalogues from 1826 and 1843 nowhere a *C. rufipes* mentioned, which must be a collection name. The name *C. lateralis* is put by Sturm himself, Catal. 1843, p. 288, as a synonym to *C. scalaris* Dej., which is our species. The *C. philadelphica* Kirby, Tr. Am. Soc., is considered as a synonym of our species by Rogers, Suffrian, Jacoby. But Rev. Bethune, in his edition of Kirby's Fa., 1883, p. 96, unites it with *C. philadelphica* of Linnæus.

REMARKS ON CHRYSOMELA SCALARIS, LEC., CHRYSOMELA LABYRINTHICA, LEC., AND PHYSONOTA UNIPUNCTA, SAY,

BY F. B. CAULFIELD, MONTREAL.

Chrysomela labyrinthica, Lec. This insect is, I believe, by some entomologists thought to be a variety of *C. scalaris*, Lec. I incline myself to the belief that it is a distinct species, but my knowledge of it is too limited for me to form a decided opinion. Both forms occur here; *scalaris* is common wherever basswood or elm are found; *labyrinthica* is scarce, and as far as my experience goes, is confined to one locality, viz., that portion of the Mountain Park lying between the head of Redpath Street and the road through the Park. I have only found *labyrinthica* during the early part of summer; *scalaris* occurs both in spring and fall. Mr. Moffat, who records *labyrinthica* from Hamilton (CAN. ENT., vol. xiv., page 57), took a specimen on May 23rd, and found its season to last about four weeks, during which he took over a dozen. It appears to be very rare, and is in very few lists. Mr. Pettit does not give it in his Grimsby List. Mr. D'Urban records *scalaris* common at Montreal, but does not mention *labyrinthica*. The same author, in his list from the

Valley of the River Rouge, gives *scalaris* as "abundant on alders throughout the district, from the end of June to the end of September," but says nothing of *labyrinthica*. Mr. Ritchie gives both *scalaris* and *labyrinthica* in his Montreal List, but without dates.

In September, 1883, I found *scalaris* in great numbers in the crevices of the bark of elm trees at Cote St. Paul, about a mile from the locality where I find *labyrinthica*. I examined several trees and could have taken scores of *scalaris*, but did not see a single specimen of the other form.

Physonota unipuncta, Say. In the July number of the CAN. ENT., Mr. Hamilton asks for information concerning this insect. I find the form *helianthis* Rand. (3 black spots on thorax) common on what I take to be the wild sunflower *(Helianthus)*. It is double-brooded, occurring in June and again in August, but the broods when living present a very different appearance. The beetles of the first brood are entirely of a burnished gold color, and are exceedingly beautiful. The fall brood show no trace of the gold, and answer to Randall's description as quoted by Mr. Hamilton, except that I would call them blackish-green, etc. After death both broods fade to a dingy yellow, and are then exactly alike. I found what I took to be the larva common on the same plant, but did not make a description of them. As well as I can remember, they were different from those found by Mr. Hamilton. They were dark green in color, the margin not serrate or spined, and the tail, instead of being bifurcate, ended in a knot. They fed in company, and were constantly wet with semi-fluid excreta. As I did not pay much attention to them, the mature larvæ may have escaped my notice, and may have been similar to those found by Mr. Hamilton. I have not seen Randall's description, and do not know if he mentions the difference in color in the broods. In this locality all the beetles of the first brood were golden, and all of the second were blackish green, with yellowish white spots. Both beetles and larvæ were very sluggish.

[Read before the Montreal Branch, 11th Nov., 1884.]

THE PROPORTION OF THE SEXES IN CICINDELA VULGARIS, SAY, AND OTHER NOTES ON THE SPECIES.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

The proportion of the sexes in insects often throws much light upon the habits and appearance of the species. Having had good opportunity to

make observations of this kind upon *Cicindela vulgaris* Say, in collecting a large number of the beetles, I have made out the appended table, which will explain itself. The dates I give, as they will show how the sexual proportion varies at different times of the season. From my observations it would seem that when the insects first appear in spring the females are much the more numerous ; but that when they first appear in fall the males outnumber the females as two to one. I have taken this species here from 3rd March (1882) to 25th October (1884).

The examination, as shown in the table, of over 1,500 specimens, as the figures stand summed up, shows the average proportion of males to females as 1.15299 + (approximately 1.153) to 1 ; or 115.3 males to every 100 females. The number examined being so large, the figures will be trustworthy. This is the average proportion through the whole year of those taken while out in their favorite haunts. I have also secured specimens in spring by digging them from their holes, where they had retreated on account of cloudy weather. All that I have ever taken in this manner have invariably been females. Some reference is made to this in the notes at the bottom of the table.

During the past few seasons I have amassed quite a stock of notes on this species, referring to many random observations on the perfect insects, the more important of which I will here give. As to variation in the elytral markings, many of the smaller specimens (generally ♂) have the bands narrowed into mere threads, being very much slighter than usual. The markings in both sexes vary from the full, broad bands or lunules to thin threads, and are sometimes partly defaced, as it were, at each end. Occasionally robust specimens (generally ♀) are found, which vary from the typical form by having the ground color of the upper parts very dark, approaching to black. In size there is also much variation ; large males and small females occur, though, as is well known, the reverse is the general rule. Small specimens with well developed lunules also occur, and large ones sometimes have them narrowed and fainter than common. The male sexual character of the creamy fronts of the mandibulæ is well known, but I have taken females with this character nearly as well developed as in the males.

The pleasant-scented fluid which is so copiously emitted from the mouth is generally of a brownish color ; however, in one specimen that I have noticed it was of a dirty greenish, while in another it was of a brick-red color. This fluid probably serves to soften the parts of insects to be

devoured, for I have noticed that where it comes in contact with the net, holes will appear much sooner than elsewhere. This also explains its sweet, honey-like smell, and probably taste, which it would need in order to make the insects' food agreeable to it. Undoubtedly this fluid helps much in digestion. When one of the beetles is held in the fingers, it will attempt to bite with its mandibles; but, finding it is unable to pierce the skin, it emits an abundance of the fluid upon it. Though it may not really intend to eat a person, this may be a mechanical action, which is performed whenever the insect feels a desire to use its jaws effectively.

When the female sexual organ is forced out, it is often found covered with a pure white milky fluid, but sometimes this fluid is of a drab color.

This species assimilates well in color with its surroundings, but of this I will speak more fully elsewhere. I have several times noticed specimens alight on old rail fences, and also on stumps in the edge of woods; these are variations from their usual habits. As to their flight, it is sometimes very irregular, continuing so for a considerable distance; and they even occasionally hover (just for a moment, apparently in uncertainty) preparatory to alighting. I have often observed quite long flights in this species, though generally not above a certain height. However, I noticed one which was unusually high. The specimen having flown up from the sand, rose higher and higher in the air, sailing continually from me, until I lost sight of it from the distance. It must have risen fifteen feet at the least, and continued sailing at this height (flight while rising also included) for sixty or seventy feet, and was still rising and sailing on when I could no longer distinguish it on account of the distance. This flight out-does all I have ever observed in this species. The wind probably aided it some, but there was only a moderate breeze at the time.

I witnessed some curious actions one day on the part of one of these tiger beetles. A male specimen rushed several times at a large wasp which was making a hole in the sand near by; and once it ran into the hole (which was in the side of a bank), but immediately reappeared, whereupon I captured it. The beetle was perhaps anxious to secure the egg, which it knew the wasp would deposit in the sand; or, still more likely, was in quest of the insect victims with which many of the Hymenoptera stock their nests.

I have often noticed specimens of this species, which are unable to fly, but are very active on their legs, running extremely fast and dodging

one's fingers repeatedly. They are of both sexes. Individuals occur which connect these runners with the flyers, inasmuch as they are able to make very short leaps while running, using the wings to assist them at these times. Of all of these specimens unable to fly that I have examined (and I have examined nearly all I came across), I have succeeded in finding alar defects in but one; in this one the marginal nervure of one of the wings was broken, where the wing folds to be laid under the elytron. In all the others the wings were to all appearances as well formed as in any specimens of the species. This peculiarity is no doubt due to a weakness of the muscles which control the wings, tending towards a form incapable of flight and in which the elytra are connate.

Specimens are often taken mutilated; and these, though in the majority of cases males, are quite often females. So it would appear that in this species the females have some fighting to do, as well as the males. In one instance I took a male which was lying on the sand right side up, apparently lifeless, but unmutilated; it had just enough life left to move its mandibles as I picked it up. Others are taken with their antennæ, legs or elytra injured, or even wholly wanting. I have taken one specimen which had lost both elytra. Mutilated ones seem to occur in the greatest proportion towards the last of the season, and then they are in general most badly mutilated. On 13th October, of the nine specimens taken, six were males, and all of these but one mutilated; one had its left elytron half nipped off, and the others a sad state of the legs, many being entirely gone. One of the females also had a leg missing.

I have observed a deformity in this species in a female taken with one elytron imperfectly developed, there being a wrinkle or plait taken across it near the extremity. This female was a small one, and in addition to the deformity had the tarsi of two of the legs missing.

It may be well to add what effect the cyanide of potassium has upon these beetles. They generally seem anxious to have something in their jaws when they die under the influence of this chemical. If they cannot get a leg or an antenna of some fellow beetle in their grasp, they will often die with one of their own legs clasped tightly in their mandibles. Several specimens were taken out after having been about forty-five minutes in the cyanide bottle. The only parts that showed life were the posterior tarsi; there was a frequent twitching of the final joints in these. After being out some time, some of the other tarsi were similarly affected, and probably the insects would have gradually recovered their full powers, had I not

replaced them in the bottle, where the action of the cyanide slowly extinguished the remaining sparks of life.

TABLE SHOWING THE PROPORTION OF THE SEXES IN CICINDELA VULGARIS, SAY.

Date of Capture.	*Whole No. Taken.*	*No. of ♂.*	*No. of ♀.*
* 19 March, 1882	5	1	4
† 28 " "			
22 August, 1883	6		
23 " "	4		
31 " "	54		
2 Sept. "	121		
3 " "	127		
19 Oct. "	25		
Date unknown	195		
	532	268	264
26 August, 1884	26	17	9
29 " "	132	72	60
30 " "	3	2	1
4 Sept. "	29	18	11
6 " "	255	124	131
8 " "	120	68	52
15 " "	1	1	
16 " "	73	44	29
17 " "	273	159	114
‡ 23 " "	6	2	4
25 " "	50	26	24
6 Oct. "	33	20	13
13 " "	9	6	3
25 " "	1	1	
Summary	1548	829	719

* Of 17 taken from their holes, all were females.

† Of all taken, both in holes and out, there were 45; 14 males and 31 females. In those that were out the two sexes were about equal in number. But all of the dozen or more taken in their holes were females.

‡ Were taken under rails on a sandy piece of plowed ground, the weather being cloudy and threatening rain.

FURTHER EXPERIMENTS UPON THE EFFECT OF COLD APPLIED TO THE CHRYSALIDS OF BUTTERFLIES.

BY W. H. EDWARDS, COALBURGH, W. VA.

In CAN. ENT., vii., p. 236-240, I gave an account of experiments with *P. Ajax*, placing the chrysalids on ice. In vol. ix., 4 and 203, of *Ajax*, *P. Tharos* and *L. Pseudargiolus*. In Psyche, iii., 6 and 15, these were all brought together, and additional observations on *G. Interrogationis* were given; also p. 174, on *L. Disippus*. In the case of the seasonally-dimorphic *Ajax*, the conclusion was reached, Psyche, iii., 18, that the longer the exposure the more decided the change, but changes had been produced at 11 to 30 days; at and under 8 days no change was perceptible. That 30° to 40° Far. seemed to be the proper temperature for the purpose. That the effect of the cold was to albinize the butterfly, the black area being constantly reduced.

That with *G. Interrogationis*, after the chrysalids had hardened, i. e., about 12 hours after pupation, 14 days exposure, temp. 35° to 45°, had been found sufficient to produce marked changes in coloration. That with different species the degree of temperature required to produce the most decided change varies; the experiments best succeeding with *P. Tharos* at 40°, *Ajax* 32° to 40°. At 32° had destroyed many Grapta *Interrogationis* chrysalids. The effect of the cold was to melanize the butterfly in certain parts of the fore wings.

In the case of *P. Tharos* a complete change of form was brought about, the butterflies which naturally would have come out the summer form, in every case coming out the winter form. Some chrysalids exposed before they had hardened, at 30 to 60 minutes after pupation, were not changed in form, but the colors had run, making what is called "suffused" specimens; but the butterflies from chrysalids which had been from 1 to 9 hours old, were completely changed. *Tharos* was the only species in which it did not seem necessary that the cold should be applied only after the chrysalis had hardened, in order to change the form. In other words, this species was very susceptible to change either of form or color, and at 32° to 40°.

This year, 1884, I have continued the experiments as follows, using same treatment.

1. MELITÆA HARRISII, Scud. In all cases the tin boxes containing the chrysalids were laid on the surface of the ice in ice-house, where the

temperature was found to be 32°. On 19th May, exposed one chrysalis (A) at 5 hours from pupation, and one (B) at 14 hours. These were left for 18 days, being taken off the ice 7th June. On 14th June emerged 1 ♂, 1 ♀, both suffused on under side of hind wings, and in same manner. The male came from the chrysalis B, exposed at 14 hours, and is very melanic on whole upper surface, the fulvous areas being restricted to narrow bands. In the female (A) exposed at 5 hours, the fulvous area is not different from that of some examples not exposed to cold. Both these, on under side, have the buff spots of discal band in the costal and subcostal interspaces lengthened so as to connect and become confluent with the buff marginal spots. In the male the two wings are not equally affected, the left wing having three of these spots confluent, the other only one completely, and one nearly. Another male (C) exposed at 18 hours old, and for 9 days, is melanized on upper side, but to a less extent than the male (A). On the under side of hind wing the buff spots are largely reduced in size, and often obliterated; of the 5 spots next base, 3 are represented only by black (that is, the buff has passed away), and the other 2 are reduced to less than half the usual size; the discal band is reduced to small, disconnected spots. In the normal examples this band is cut by two black lines running across the wing, leaving the middle section broad, and the two outer sections made up of small spots. There is a little irregularity in the course of these black lines, but the result is that on the 4 interspaces next costal margin there are 3 buff spots to each, 2 each to the next two interspaces, and 3 on the last interspace (or sub-median). In the example under view the whole of the anterior row of buff spots is wanting. In the normal example there is also a complete sub-marginal row of pretty large buff lunules; in this other all are wanting except two narrow crescents in the median interspaces and a streak in the discoidal interspace.

A ♀ (D) exposed at 24 hours, and for 9 days, is not changed on upper side, but on under hind wing the buff discal band is nearly obliterated, the whole of the inside (and longest) spots being lost. The spots about base are not changed, nor are the submarginal crescents. Another ♀ (E) exposed at 24 hours and for 9 days, is not changed on upper side, but on under hind wing the submarginal crescents are lost, excepting in the two median interspaces, and there they are reduced to narrow bars; all the buff of both wings is changed to yellow.

On 13th June, I placed 10 chrysalids on ice, at 6 to 24 hours old; on

14th, 7 more, from 15 to 24 hours old; on 17th, two at 12 and 24 hours, in all 19 chrysalids. These were left till July 13th, or from 26 to 30 days. But three survived the exposure, one of which (F) gave ♀ 23rd June (chrysalis on ice 26 days). This example was in some respects more changed than either of those before mentioned. One hind wing was smaller than the other, and was free from all fulvous above; the other had the fulvous restricted to a narrow band on disk, with a row of minute spots posterior to it; the fulvous on the disks of each fore wing was also reduced to a narrow band. Beneath, the colors of fore wings were all dull, the black changed to brown; the submarginal buff spots were much enlarged and extended quite across the wing; the smaller hind wing, which had lost color on upper side, had no fulvous or buff on the outer half, but the discal buff band was present, though greatly narrowed, and nearly obsolete. The other wing had the discal band narrowed but distinct, the spots which constitute it separated instead of confluent, and the small spots outside the black lines which cut this band are entirely wanting; but the two spots of this band next costa were lengthened and confluent with the submarginal buff spots; also the fulvous ocelli which go to make the third band from the margin are nearly obliterated. The other two butterflies which came from this lot of chrysalids, one at 28, one at 29 days, were both cripples, the wings twisted, but as they were expanded to nearly full size, it can be seen that they are greatly altered, the colors more or less suffused, and the markings indefinite. As I have indicated, 16 out of the 19 chrysalids of this lot were killed outright, and no doubt by the length of the exposure to so severe a degree of cold; two emerged cripples, and the other partly crippled, one wing being affected.

But several of the chrysalids experimented with were not affected, viz., 4 at 6 hours old, for 9 days, 1 at 6 hours old, for 10 days. These all gave butterflies in no way differing from those not iced.

Thus it appears that

1 chrysalis, 5 hours from pupation, exposed 18 days,
1 " 14 " " " " 18 "

were much changed, the fulvous area in one, A, restricted on upper side, and both have the colors considerably suffused on under side.

1 chrysalis, 18 hours old, exposed 9 days,
2 " 24 " " " 9 "

were much changed, but in a different way from those first mentioned,

chiefly by the restriction or obliteration of the buff bands and spots on under surface.

One chrysalis (F), 12 hours old, exposed 26 days, still more changed, and that on both surfaces, by restriction and obliteration of the fulvous on upper side, and the obliteration of both buff and fulvous on lower side, besides being partially crippled.

Two chrysalids exposed 28, 29 days, were changed in same manner as F, but were wholly crippled.

In all, I obtained 14 butterflies from these iced chrysalids, 8 of them changed materially, 6 not at all.

In all cases the emergence of the butterfly was retarded by the full period of the exposure to cold. The butterflies appeared at from 5 to 7 days after the chrysalids were removed from the ice. At same time others, not iced, were coming out at from 5 to 8 days, according as the weather was clear or otherwise. *Harrisii* is a single-brooded species, and therefore there could be no such change of form as was brought about in *Tharos;* any changes would be limited to color or shape of markings, and would not be uniform.

2. Melitæa Phaeton.—I had a large number of chrysalids from hibernating larvæ which I had raised the year before, and 39 of them were placed on ice (temp. 32°), at various periods from 2 to 34 hours after pupation, and exposed from 10 to 27 days. The emergence of the butterflies was in all cases retarded, so that the length of the chrysalis stage after removal from the ice was the same as after pupation normally. But no perceptible changes were made in color, nor were any chrysalids killed by the cold. I fully expected to see suffusion and other marked changes in this species. Beautiful variations occur in *Phaeton*, as in other Melitæas, in nature, and I cannot but think that another series of experiments, with perhaps a longer exposure to cold, might serve to produce similar variations in the house.

3. Melitæa Chalcedon. I had but one chrysalis, which came from a hibernating larva fed by me the previous year. This at 25 hours old was on ice 27 days. The imago died just when ready to emerge, and so far as could be discovered the colors were not affected. This species also is subject to sports, and suffused examples are to be found in nearly every collection of butterflies.

4. Grapta Comma. On 1st June I placed on ice 2 chrysalids less

than 1 hour old, and 2 at 6. They were removed 22nd June, and all were dead and shrivelled.

5. Apatura Clyton. Similar exposure to that of *Comma*, but at 12 to 24 hours gave similar results, all being killed. I had reason to expect as much in the case of *Comma*, as I had in former years lost all or nearly all Grapta chrysalids which were exposed before they had fully hardened. But I thought I would try severe measures once more, relying on obtaining further larvæ of *Comma* for milder treatment. Unfortunately I could find no more larvæ. This species being seasonally-dimorphic, it would seem as if there should be a change of form under these experiments, if tried in a proper manner.

6. Papilio Philenor. Nine chrysalids, at 6 to 36 hours old, left for 23 days on ice, were all killed but one, which gave butterfly unchanged.

7. Papilio Troilus. One chrysalis exposed 15 days gave butterfly unchanged.

8. Limenitis Ursula. I placed one chrysalis at 4 hours old on the ice and kept it there 13 days. From this came a large ♀ after 9 days, or at the period usual for this species. This shows some peculiarities which may or may not have been owing to the exposure. One cannot decide from a single example. The *Ursulas* taken in this region have the metallic spots and the metallic area on disk of hind wing either all green or all blue; and the discal area spoken of is separated from the submarginal green or blue spots by a pretty wide black space, forming a band from costal to anal margin. In this iced example the black band is narrowed to one half that of any other in my collection, and instead of being uninterrupted, it is crossed next costal margin by three of the discal spots (or in three interspaces), which become confluent with the submarginal spots. The spots and bands are green, except that on one wing the spaces on disk lying between the branches of the median nervure are purplish-blue. The same distinction holds on the under side.

9. Lycaena Pseudargiolus. On ice 4 chrysalids, 24 hours old, and kept there 23 days. By oversight a nearly mature larva of same species had been shut in with the chrysalids, and had eaten into one of them. But the larva and the other chrysalids were dead.

THE CRANBERRY FRUIT WORM.* *(Acrobasis vaccinii.* N. sp.*)*

BY PROF. C. V. RILEY.

Acrobasis vaccinii. n. s.—General color and appearance of *A. indiginella* Zell. *(nebulo* Walsh) but a somewhat smaller species, with primaries usually narrower. It may be distinguished by the following differences as compared with *indiginella:*

Average expanse, 15 mm. Colors of a colder gray with less reddish-brown or tawny on the inner portions of primaries, and with the pale costal parts nearly pure white, so as to contrast more fully with the dark shades, and to more fully relieve the basal branch of the forked shade on inner part of first or basal line, this basal branch being also usually darker than the outer or posterior branch. The triangular costal patch from the basal line is obsolete. The transverse pale lines are less clearly defined and the terminal is nearer the posterior border of the wing, *i. e.*, the median field is wider. The geminate discal dots are always well separated and the inner one well relieved by the white which extends around it on the darker ground and often forms an annulus. The oblique shade from apex is less clearly defined.

Described from 16 specimens of both sexes, reared from cranberries.

Egg.—About 0.4 mm. long, and 0.3 mm. broad; ovate or almost circular, and flattened or plano-convex, the form varying with the surface of attachment to which, while plastic, it partly conforms. Color, olive-green or brown.

Larva.—Average length when full grown 10 mm. Convex above, flattened beneath. Surface of body minutely granulate with a dull, somewhat greasy appearance. Color varying from greenish-yellow to olive-green, reddish or brownish, being generally darkest towards the anal end. Head yellow, polished, somewhat lighter towards the mouth, with the sutures of the clypeus slightly brown, and the anterior angles of the head distinctly so; labrum, antennae and palpi white; mandibles yellowish at base, becoming blackish toward tip; ocelli black. Cervical shield somewhat paler than the head, almost colorless anteriorly, its median line scarcely paler, without any markings, except a brownish or blackish wart a little in front, above the stigma. Anal plate of same color. Stigmata extremely small, except first and last pair, oval and pale brown. Pili-

* From advance copy from the forthcoming Annual Report of the U. S. Entomologist.

ferous warts only about half the size of stigmata, very pale brown and polished, each supporting a fine hair of a faintly yellowish color, of which those on the posterior row of warts are much the longest and are directed forward. Similar long hairs are also on the head, thorax, around the margin of the anal plate and along the sides of the body. Legs concolorous with body.

Pupa.—Average length 7 mm. Brownish-yellow. Stigmata brown. A dorsal, dark brown, transverse band, anteriorly on last joint. Tip broad, almost straight, having a small tooth at each angle, and along its inferior edge four fine yellowish-brown bristles, twisted and directed forward. Abdomen shallowly punctate.

In the series of American Phycids, this species naturally follows *indiginella*, and it is at once distinguished from this, from *juglandis* LeBaron, and from *fallouella* Ragonot—its nearest European ally—by the obsolescence of the triangular costal patch.

Mr. Grote in his last "Check list of N. A. Moths," has suppressed *Acrobasis* Zeller, and referred this little group of Phycids to "*Phycis* Haw." He has also made *juglandis* a variety of *indiginella*. These changes I regard as unjustifiable. *Phycis* as a genus was founded by Fabricius, and Haworth's *Phycis* comprised nearly all the species of the family, and the name has long been abandoned in modern more exact classifications; while the full descriptions, figures and larval histories of *indiginella* and *juglandis* in my 4th Rep. on the Insects of Mo. (pp. 38-43) prove beyond all question the specific value of both.

There is a *Nephopteryx vacciniella* Zeller or *Vaccinium uliginosum* in Europe, and for this reason I have dropped the conventional termination in the name of our species.

NOTE ON INEQUALITY OF THE ELYTRA IN ALAUS OCULATUS.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

On 19th October, 1884, I took from a decaying hickory stump a specimen of *Alaus oculatus* (Linn.), which had its left elytron .75 mm. shorter than its right. This seemed to me a curious and very noticeable deformity, and one I had never before observed. But on 13th December

ensuing I discovered that a fine, robust specimen which I had taken from decaying hickory the day previous had its left elytron .25 mm. shorter than its right, this time the difference being much less, but still noticeable. I then examined fifteen other specimens of this species in my collection, with the following result: One with left elytron .25 mm. shorter than right; one with left .20 mm. shorter than right; one with left shorter than right, but the difference hardly appreciable; one (small specimen) with right .20 mm. shorter than left; and one in which the right was so slightly less than the left that the difference could scarcely be seen. The remaining ten showed no appreciable differences in this respect. So of seventeen specimens examined, seven had the elytra unequal in length in a considerable degree, one being especially prominent thereby. And it is noticeable that in five of the seven specimens it was the left elytron that was the shorter, these also being the cases in which the inequality was most prominent. I believe all of my specimens, with one exception, were taken from their cells in the wood, as they are found after having assumed the imago. I have no doubt that if others would examine the specimens of this species in their collections, many more such examples would be found which have been overlooked. It would be interesting to know the result of such examinations. It is probable that the elytra, being organs not of strictly primary value to the insect—elytral invariability in this direction not being absolutely essential when within certain limits—have thus been permitted to vary without the variations being struck out by natural selection. I have not observed this elytral inequality in any other Coleoptera as yet.

A form of this species, which is less robust, I occasionally find; it is slightly narrower in proportion and more delicately marked, but upon sending specimens of the two to Dr. Horn, he informs me that they do not differ appreciably, but are both *oculatus*.

CORRESPONDENCE.

NOTE ON THE HABITAT OF XYLORYCTES SATYRUS.

Dear Sir: Mr. W. F. Robinson, of Bridgeton, N. J., sent, Oct. 28, 1884, a specimen of this beetle, with the remark that it is being dug up around the roots of trees there in abundance by his school boys. The collections here contain it not farther to the north than Pennsylvania. Not

being able to find it recorded from N. J., or farther to the north, I should like to hear if its occurrence north of Pa. is known. I may add that Mr. Robinson gave to the collection a very small specimen of *Strategus antaeus* collected by him in Nantucket, Mass., Aug. 24, 1884.

DR. H. A. HAGEN, Cambridge, Mass.

Dear Sir: In reference to your article in the August number, allow me to add as injured by *Pulvinaria innumerabilis*, the following: No. 1, *Acer saccharinum;* 2, *A. rubrum;* 3, *Negundo aceroides;* 4, *Ulmus fulva;* 5, *U. americana,* 6, *Celtis occidentalis;* 7, *Morus rubra;* 8, *Fraxinus sambucifolia;* 9, *Populus balsamifera;* 10, *Juglans cinerea;* 11, *J. nigra;* 12, *Rhus toxicodendron. Tilia americana* I have not seen affected here; our cultivated grape *(Vitis)* very seldom, and sparsely, if at all, while our wild grape seems perfectly free from the pest. This insect, better known here as the Maple-slug, has been found by me on all the above, never taking note unless I found it at least six times on the same kind of trees, growing far apart and in quantities as follows: On No. 1, sparsely; 2, soft maple, very full; 3, ash-leaved maple, better known as box-elder, very full, equal to No. 2; 4, 5 and 6 less affected but alike; 7, 8 and 9 sparsely; 10 and 11 least affected, while 12 (being our poison ivy) only when the tree to which this parasitic plant was attached was affected. I had made my observations in Peoria, Tazwell and Livingston Counties, and have noticed in the City of Peoria especially the stone pavements sprinkled with the so-called honey dew in patches here and there, so thick that any passer-by would look up wonderingly unless familiar with the cause. As such articles are of interest to farmers and to growers of shade trees, they will be glad to get such information as experience can give them through some observation. The last visit of this insect in great numbers was about five or six years ago. The question here has frequently been asked with some anxiety: How will they appear next season, etc.? Their natural enemies and wet weather, especially when the rains come frequently during hatching, as well as other causes, are among the agencies which limit their increase.

A. H. MUNDT, Fairbury, Ills.

August No. Mailed Nov. 17, 1884.
Sept. " " Dec. 1, "
Oct. " " " 17, "
Nov. " " " 24, "

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ERRATA.

Page 227—8 lines from top, for "unipuncta" read "unipunctata."
" 213—11 lines from bottom, also 3 lines from bottom, for "J. W. Fyles" read "T. W. Fyles."
" 214—10 lines from bottom, for "fungus" read "fungous."
" 214—4 lines from bottom, for "ovæ" read "ova," and for "Tachnia" read "Tachina."
" 214—5 lines from top, for "Smyth" read "Smith."
" 214—2 lines from bottom, for "Homopteron" read "Hemipteron."
" 217—16 lines from top, for "Nepigon" read "Nipigon."
" 217—2 lines from bottom, for "nigricornis" read "nigrirostris."
" 218—12 lines from bottom, for "Vespa?" read "Vespa—?"
" 218—10 lines from bottom, for "Pieris" read "Pamphila."
" 218—9 lines from bottom, for "P. centaurea" read "Pyrgus centaurea."
" 219—2 lines from top, for "A. Macoun" read "W. Macoun," and for "Nepigon" read "Nipigon."
" 219—7 lines from top, for "Ptinidæ" read "Ptinus."
" 219—22 lines and 12 lines from bottom, for "S. W. Taylor" read "G. W. Taylor."